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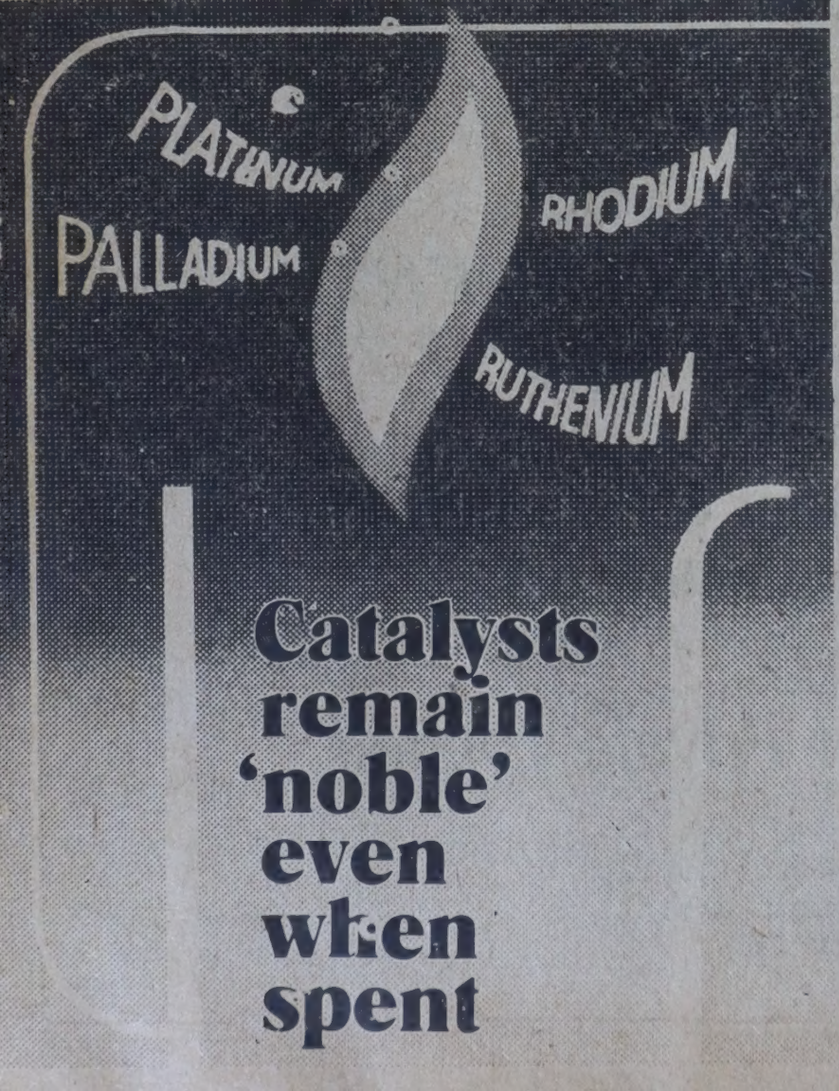
34th YEAR OF PUBLICATION

Chemical Weekly

VOL. XXXIV AUGUST 8, 1989 NO. 48



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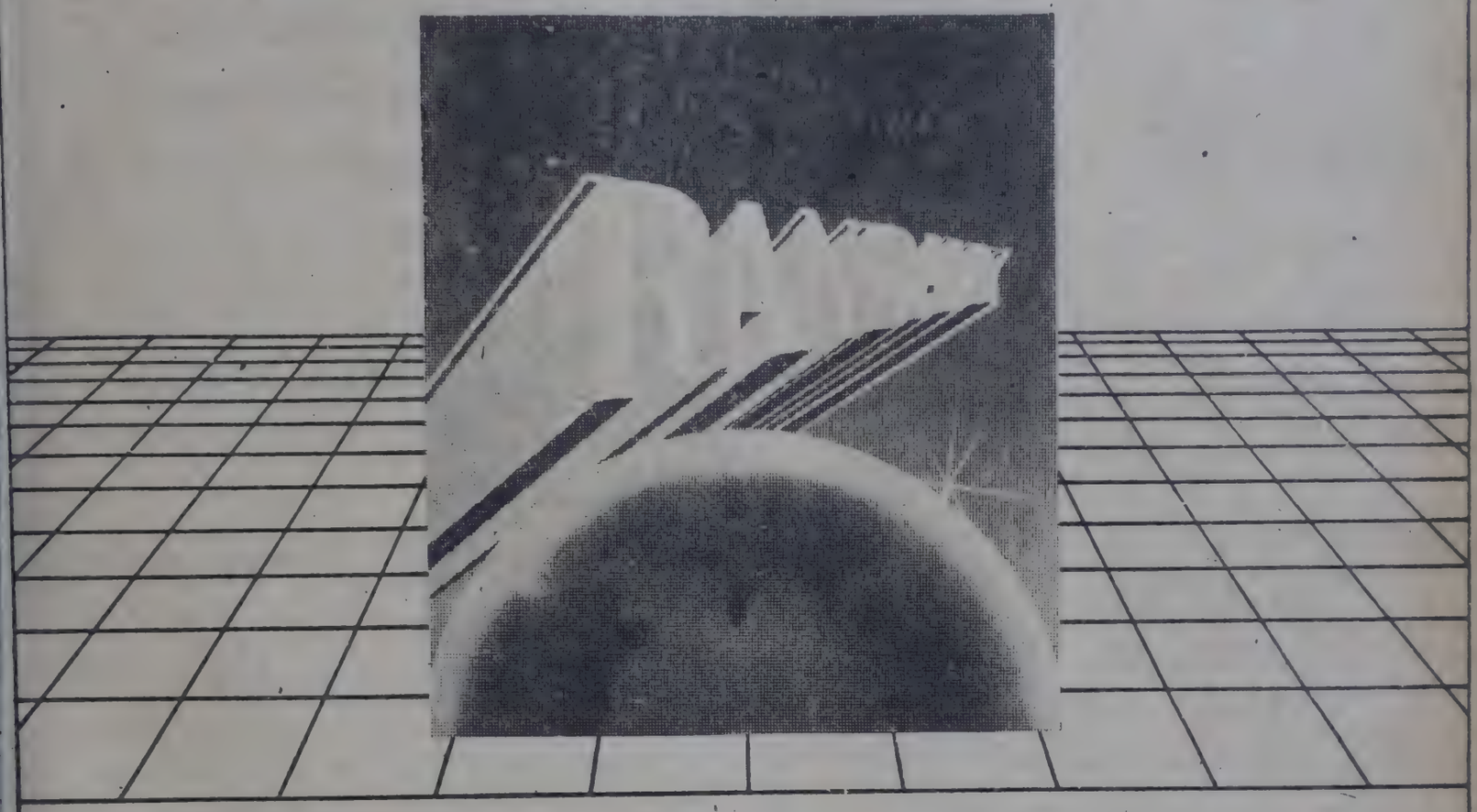

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CHEMICAL WEEKLY

VOL. XXXIV AUGUST 8, 1989 NO. 48

HERALDING THE 21st CENTURY - 25 (d)

The Environmental Challenge: Controlling Toxic Chemicals

Both the volume and number of manufactured chemicals have burgeoned since World War II. In the United States, annual production of synthetic organic chemicals rose fifteen fold between 1945 and 1985 from 6.7 million metric tonnes to 102 million. Worldwide some 70,000 chemicals are presently in use with 500 to 1000 new ones being added to the list each year. No limit to the number of possible synthetics is in sight.

Prior to the forties the farmers relied on a combination of mechanical, chemical and biological methods to limit pest damage to crops. The discovery of DDT ushered in an era of almost exclusive dependence on chemicals for pest control; DDT was safer and more effective than arsenic, heavy metal, cyanide and nicotinic compounds. Synthetic chemicals freed the farmers from much of the worry and complexity of controlling insect pests with the result that interest in nonchemical methods of pest control dwindled.

In the United States, pesticide use in agriculture nearly tripled between 1965 to 1985. The current average is about 3 kgs. per hectare planted. Roughly 70% of all cropland and 95% of the area devoted to corn, cotton and soya beans receive some dosage of pesticides.

In India, pesticide use increased from some 2000 tonnes annually in the fifties to the 80,000 tonnes mark in the mid eighties. Chemicals are part of the package of inputs actively being promoted to boost Third World food production through the Green Revolution. The shift towards greater production of export crops has also spurred pesticide use, since investment in chemical inputs almost always results in immediate pay offs.

Countries apply different definitions to which they variously call "hazardous" waste which obscures comparisons between various countries. Much waste is disposed off in or on the land through the use of injection wells, pits, ponds, lagoons and landfills. Each of these practices risks contaminating ground water, since experts claim that even the most carefully constructed landfill and surface impoundment will eventually leak.

Pesticides account only for a small share of the 70,000 chemicals in common use but they pose some of the greatest potential hazards. Moreover since they are spread widely over the land, they pose risks not only to farm workers but to the general population through residues in food crops and through contamination of drinking water.

Between 400,000 to 2 million pesticide poisonings occur worldwide each year, most of them among farmers of developing countries. No comparable estimates exists for deaths or disease caused by chronic low level exposures to farm chemicals but the picture is far from comforting.

In China for example, where some 400 million tonnes of industrial waste and tailings are generated annually, much of it undoubtedly hazardous, mounds of harmful wastes reportedly occupy some 60,000 hectares of open land today.

Residues of such compounds, all suspected carcinogens, were found in all 75 samples of breast milk collected from women in Punjab. Through their mother's milk, babies daily were ingested 21 times the amount of these chemicals considered acceptable. Similarly samples of breast milk from Nicaraguan women have shown DDT levels as astounding as 45 times greater than tolerance limits set by the World Health Organisation.

Meat containing 7 parts per million of DDT is declared as unfit for human consumption. The average American has twelve parts per million of pesticides in their bodies. The favourite joke amongst American holiday makers on hunting expeditions in the interiors of the African Continent used to be "Cannibals beware -- American's flesh unfit for consumption".

Another recognised path way of pesticide exposure -- contamination of drinking water -- is of immense concern to the future of mankind. No nation has systematically monitored its water supplies for pesticides to the full extent known. But the present environmental situation is best summarised by the light hearted observation "One cannot breathe the air in the industrialised countries nor drink the water in less advanced countries". (Subsequent paras will bear out the fact that industrialised countries are fast bringing their drinking water qualities to the level of less advanced countries).

In the United Kingdom preliminary investigations suggest widespread contamination of rivers and streams in the agricultural areas of eastern England. The herbicide atrazine, contaminates most surface waters in the region and has been found at levels nearly three times the acceptable concentration for herbicides in drinking water standard set by the European community. In the United States, routine agricultural practices have contaminated ground water with more than 50 different pesticides in at least 30 states. The nation's two

of the most widely used herbicides -- alachlor and atrazine -- are among those most frequently detected.

Widespread pesticide use is often justified by cost benefit data to the effect that benefits far outweigh the risks and costs. But even here the gap is reported to be narrowing. Insects and weeds now reduce crop production by about 30% -- apparently no less than before the chemical age dawned on the agricultural areas. Because of the increasingly stringent regulations, it costs now about $40 million to introduce a new pesticide to the market compared to about 1.2 million in 1956.

Another interesting fact is that the pests have evolved mechanisms for detoxifying and resisting the actions of chemicals designed to eradicate them. Farmers and pesticide producers have thus locked themselves into a race with the rapid evolution of crop pests. In some instances, chemicals intended to enhance and stabilise agricultural production have just done the opposite. In Nicaragua, 15 years of heavy insecticide use on cotton were followed by four years in which the cotton yield was 30%. Farmers often react to the situation by increasing the pesticide dosages. In a classic case of the "pesticide treadmill" insect control costs rose to a third of the total cotton production costs.

Chemicals no longer provide the effective means of crop protection they once did. In 1938, scientists knew of just seven insect and mite species that had acquired resistance to pesticides. By 1984, the figure has climbed to 44 and included most of the world's major pests. Resistance by weeds was virtualy non-existant before 1970 but after the introduction of herbicides, 48 weed species have gained resistance to chemicals.

In Suffolk county, Long Island, the leading farm county in New York State, chemicals are losing the battle against Colorado potatos beetle. Growers pay upto ten times per season and pest control costs have climbed as high as $700 per hectare. Other cropping systems at risk include cabbage and rice in certain areas of South East Asia, corn in the United States; potatoes in parts of Europe and eastern United States, sugar beet in the United Kingdom. As with pesticides the consequences and risks of major industrial chemicals are only now beginning to be characterised nearly a decade after the Love Canal Site, Niagara Falls, New York, spotlighting the insidious hazards posed by indiscriminate chemical waste disposal. Even today most countries do not envisage the magnitude of air, water and soil contamination caused by industrial chemicals.

Tens of thousands of active and abundant waste disposal sites dot the landscape of industrial countries. Corrosive acids, persistent organics, and toxic chemicals accumulated for decades with little thought about their possible penetration into the environment. In West Germany, 35,000 problem sites exist nationwide. The current estimates are that remedial measures involving at least 18 billion German Marks (11 billion US dollars) will have to be taken soon to restore life back to the soil. In Denmark, which like West Germany depends heavily on ground water, upto 2000 sites are suspected to be contaminated -- the clean up costs are estimated at one billion Danish Kroner ($158 million).

In the United States, as of October 1982, EPA had placed 951 landfills, impoundment, and other waste sites on the national priority site. The agency estimates that the list will grow to not more than 2500 sites with clean up costs amounting to $23 billion. But the Office of Technology Assessment (OTA) has figured out a total of 10,000 priority sites with clean up costs mounting to one hundred billion dollars or roughly 400 dollars for every US resident.

While there is today an awareness of ground water pollution, the magnitude of the problem has yet to be appreciated. More than 200 harmful substances have been identified in the underground water supplies of the United States, including 175 organic substances. Twenty three of these organics (including semi-pesticides) and some metals are known or suspected carcinogens. Equally unsettling is the fact that a substantial share of the contaminants frequently found have not been tested for long term effects. Most remain unmonitored and unregulated. EPA standards for drinking water today cover only two dozens of the hundreds of substances detected in ground water.

Researchers in Poland have found alarmingly high concentrations of heavy metals in vegetables in the heavily industrialised region of Upper Silesia, an area which harbours numerous smelters and metal factories. Soil samples taken from vegetable gardens in the region has contained levels of cadmium, mercury, lead and zinc between 30 to 70% higher than levels considered safe by WHO.

For many countries taking on the challenge, pollution from pesticides and other chemicals found in ground water, locating and cleaning up all the leaking land fills and waste lagoons scattered across the industrial landscape will be among the highest priority items of the environmental agenda. Remedying the legacies of past mis-management, will only mark the beginning of the battle against the toxics dilemma. Unless the waste currently produced are better managed, new threats will simply replace old ones committing society to a costly and perpetual messing up of toxic chemical clean up. Moreover, without concerted efforts to reduce, recycle, and reuse more industrial waste, the quantities produced will overwhelm even the best treatment and disposal systems and the goal of risk minimising, sustainable waste management will remain elusive.

Regardless of the type of management system establisned, greater efforts are needed to curb the amounts of waste produced, rising costs, scarce treatment, and disposal capacity and public opposition to the siting of new facilities plague hazardous waste disposal programmes everywhere.

In the United States, landfill prices have sky rocketted to $24 per tonne, a sixteen fold increase since the early seventies. Incineration of organics now costs between $500 and $1200 per tonne. Waste management costs of Du Pont, perhaps the world's largest chemical producer exceed (1987) $100 million dollars annually. The vice-chairman of Du Pont manufacturing committee says that "an economical and environmentaly acceptable" waste management plan holds the key to the success or failure of many of our business.

Making industries assume responsibilities for more of social costs and risks associated with hazardous substances is crucial to fostering the transition to safer chemicals and consumer products. The health of the earth's inhabitants cannot be separated from that of the planet itself. The present indications are that manmade harmful chemicals are fast endangering the soil and water resources of the planet. Unless these dangers are removed in time, how long can men hope to survive in the coming century?

This is a question for which no candid and optimistic reply is forthcoming from the modern breed of futurologists. Humanity's survival through the coming century depends on man gaining enough wisdom and foresight to save the soil of mother earth and the immense water potential from the ravages of man's own creation.

-- T.P.S. RAJA

(Condensed from the Chapter titled *"Controlling Toxic Chemicals"* by Sandra Postel -- Chapter 7 - *State of the World 1988* edited by Lester Pearson).

CHEMARENA

S.L. VENKITESWARAN

Chemicals and Cancer

With cancer being the highest killer in many countries and some forms of malignant tumours incurable, the causes of cancer -- it should really read cancers for there is such a wide range depending on place of attack -- have always attracted much attention. The belief is widespread that some of the chemicals are causative agents and the chemical industry has had to protect its image. But there are certain chemical agents specifically identified as carcinogens -- asbestos is the most notorious -- like the linkage of smoking with lung cancer. There are many proved chemical carcinogens, some of which being dye intermediates (since discontinued) and some chloro compounds etc. Chemicals usage creates some controversies in a section of the people and media coverage is often exaggerated. Recently there are many publications covering the linkage of chemicals to cancer and one such is "In search of Safety: Chemicals and Cancer risk" by Messrs. Graham, Graeme and Roberts. The book is devoted to what the authors call "Scientific Conflict Mapping".

The authors have covered a wide array of interviews with experts in nuclear biology, epidemiology, statistics, social scientists, legal and regulatory authorities. Primary coverage is on the two controversial items -- benzene and formaldehyde. Quantitative risk assessment is always a difficult job and the risk/benefit analysis even more so, often subjective. Facts may not be conclusive whie conflicts arise between science and policies. The question of extrapolating data on small animals to human beings is often questioned by the chemical producers or suppliers. The dose-response curve for animals may not be representative for humans. Above all the question of a "threshold level" below which there are no effects is another point of arguments.

In the case of formaldehyde there has been a lot of scare as it is a common item and component of home insulation, partition in homes and common plastic products like melamine ware. The review on this item by the authors provides the exhaustive data and diverse conclusions. Benzene is a chemical to which the exposure is far less common but more frequent in work places including gas stations and chemical factories. Benzene is said to lead to certain cases of leukemia and it is a bone marrow poison. But data on its effect on cellular genetic complement is said to be controversial and there is perhaps no unequvocal evidence on links of benzene to cancer.

Cancer is an important element to premature mortality and of about 1 million cases of new cancer in USA, the fatal cases are about half. 30% of cancer types like those of respiratory tract are not related to any chemicals in the environment but to the smoking habit and other uses of tobacco. 35 to 60% of human cancers are associated with prevailing nutritional habits and traditions -- too much fat and too little greens; fibres, fruits and vegetables. US, in the name of cancer, has a vast regulatory organisation and agencies and there are many public interest groups and lawyers who make a fortune. A change in focus and policy is essential and a more rational perception is required and the tendency to blame or absolve certain chemicals must be curbed while the testing of individual potent cancer risks continue.

Slump in U.S. fertilisers

While joint ventures may help to sustain the pesticides market there is little that US producers of fertilisers can do to stay afloat. Extraneous factors such as climate and acreage restrictions by Government tend to suppress the demand -- more so when exports of grains and other agro producce face hurdles. The US fertilisers industry is said to have emerged from the red for a prosperous 2 years as revealed by these figures:

	Sales in million $	Profit/Loss Mill. $
1986	6400	- 439
1987	7000	+ 60
1988	8000	+ 740

But the slide has again started with intense competition and falling prices and too many producers. The planted acreage is down along with Chinese withdrawal from purchases and the USSR also in a comfortable position. There is a glut in ammonia and prices down to $105 ex Tampa. India, too has a minor part with its own increased production and reduced import except for the rise in DAP imports.

There are high cost plants in US also but no Government to step in with subsidies to keep them in production. Perhaps a slow process of attrition may lead to a restructuring and take overs as in other sectors.

Ethylene usage in USA

The latest published data on end uses of ethylene in USA -- a total of 37 billion lbs -- is as under:

Polyethylenes	--	51%
Ethylene oxide	--	14%
Vinyl chloride	--	13%
Styrene	--	7%
Alpha Olefins	--	5%
Vinyl Acetate	--	3%
EPR	--	1%
Acetaldehyde	--	1%
Ethanol	--	2%
Others	--	3%

The growth is expected to be 3-4% a year until the late nineties.

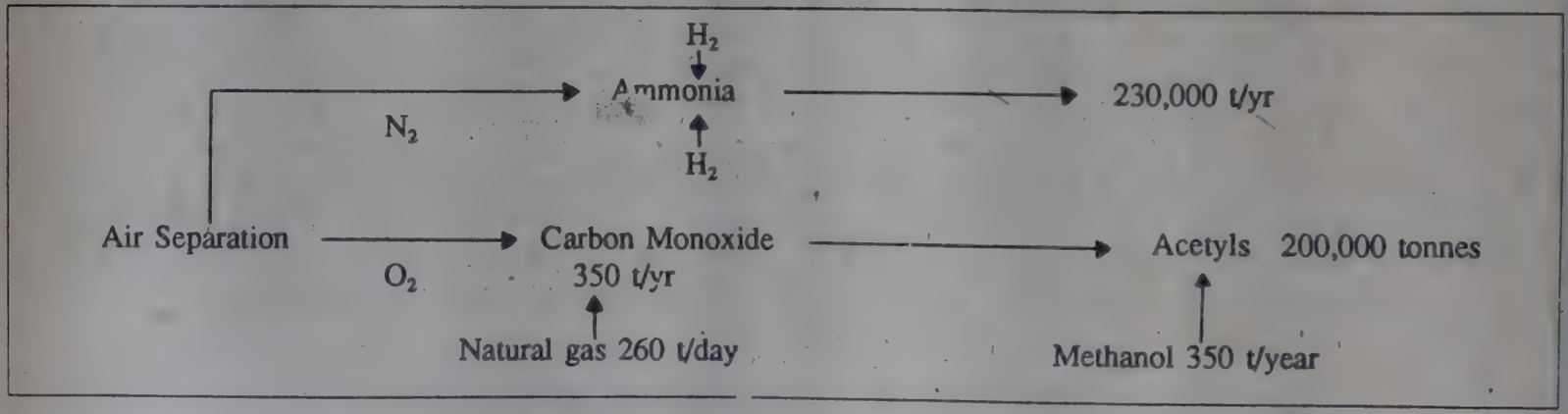
British Petroleum's new Acetic Acid complex

BP, the successors to the Monsanto acetic acid technology and plants, have recently completed a new plant for combined production of acetic acid and anhydride by the carbonylation of methanol. The combined output is 200,000 tonnes as acetic acid. Along with the US plants taken over and another one in UK, BP has a total of 600,000 tonnes. It is negotiating for plants in Taiwan of capacity 260,000 tonnes and one of 150,000 in South Korea -- on licence. BP now has 20% of world merchant market with Far East as the major buyer -- which may change when the Taiwan and Korea plants (both linked to PTA) go on stream. Celanese-Hoechst is the Number one.

BP's plant's economies depend on a delivered price of $140-150 per tonne methanol. A schematic of the complex which includes ammonia is below (as per ECN).

A single reactor is used which gives acid to anhydride in ratios of 50% ± 10%. There was a patent battle with the similar process of Haleon (used by Eastman) but the conditions of reaction were found to differ. BP process is said to use large volumes of water, adding to the corrosion and use of Hastalloy to avoid it.

It has been pointed out in these columns about the conditions in India which do not justify the use of the BP process and it is understood that the programme envisaged is being held back.



Strength in Alliance

Chemical producers even at the top level seem to be more secure with alliance and links between them. This could avoid competition and share in the newer products that emerge. The latest to link up is Dow Chemical and Eli Lilly in the agrochemicals area. A joint venture named Dow Elanco will be the Sixth in the world in pesticides and second in USA. There is a complementarity in products with Lilly's Treflan for soya and cotton and Dow's special product Lorsban for corn. The joint venture is to launch a massive agro research centre in Indianapolis at a cost of $35 million and a budget of $150 million for R & D. With the Swiss and W. German giants making inroads into the US market and Du Pont with its own share there is everything to commend the joint venture which would benefit both in USA and outside.

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Distilleries flouting alcohol price order

Barring 70 distilleries in Uttar Pradesh most of the 120 distilleries located in other states are openly flouting the Centre's Ethyl Alcohol (Price Control) Order. Although the Centre, as per an order dated June 7, 1989, had fixed a maximum selling price of Rs. 2,296 per kilolitre of industrial alcohol, distilleries in all the states except in U.P. are selling the same at prices ranging from Rs. 3,000 to Rs. 3,500.

For instance, distilleries in Maharashtra are selling industrial alcohol at Rs. 3,150 per kilolitre. Gujarat and Karnataka distilleries are selling at Rs. 3,500 and Tamil Nadu distilleries are selling at Rs. 3,000. U.P. Distilleries are, however, selling the alcohol below the maximum price because of serious glut in the state, as some of the large industrial users have switched over to other feedstocks. Informed sources say that flouting the Centre's order is done by the distilleries with full connivance of the respective state governments. In fact the state governments are expected to ensure availability of alcohol at the government fixed price to the user units.

The state governments are responsible for the allocation of molasses from sugar mills to distilleries and also distribution of industrial alcohol to chemical and potable sectors. The alcohol-based chemical industry is hesitant to complain to the Centre about the open violation of the Ethyl Alcohol Order by the distilleries as they fear that the distilleries might cut supplies of alcohol to such chemical units. The sharp hike in the statutory price of alcohol to Rs. 2,296 from Rs. 1,260 per kilolitre is expected to hit the alcohol-based chemical units badly with an inevitable increase in the prices of organic chemicals like acetic acid, acetone, glyoxal, styrene etc.

With the expected production of one million tonnes of sugar in the current sugar season, molasses production in the country is expected to be 45.45 lakh tonnes. Increased availability of molasses and non-lifting of it by the distilleries in U.P. are likely to cause a serious storage problem to sugar mills in the coming months.

Meanwhile, the government's export plan for industrial alcohol is facing a serious setback. Although the government has sanctioned export of 1200 lakh litres, only 400 lakh litres have been exported so far. Alcohol export is held up mainly because of lack of storage facility at the Kandla port. The international price for alcohol has firmed up to $400 (f.o.b.) per tonne now with the withdrawal to Brazil, the largest exporter of industrial alcohol.

EIGHT LIs ISSUED TO MAKE POTABLE ALCOHOL

The Union Government has issued Letters of Intent (LIs) to eight proposals in recent months for the manufacture of potable alcohol. The grants have come in the wake of the relaxation of the ban on creation of fresh capacity. Interestingly, of the eight applications for the manufacture of potable alcohol based on non-molasses raw materials, as many as five proposals were from State Industrial Development Corporations. Of the remaining three, two were from established units in the private sector and the other from an entrepreneur in Madhya Pradesh.

The Uttar Pradesh State Industrial Development Corporation (UPSIDC) has been issued one LI to manufacture 3.82-crore bottles of Indian-Made Foreign Liquor (IMFL) grade potable alcohol from potato. The other UP State unit is the Pradeshiya Industrial and Investment Corporation of Uttar Pradesh (PICUP) which has been allowed to produce 11,000 kilolitres of potable alcohol per annum.

The Himachal Pradesh State Industrial Development Corporation (HPSIDC) has been given an LI for the production of 30 lakh litres of apple cider. The units may be based at Barotiwala, Nalagarh and Solan. The LI to the Haryana State Industrial Development Corporation (HSIDC) is for the manufacture of 9,000 kilolitres of IMFL per annum at any of the centrally-declared backward districts of the State.

The proposal by the Kerala State Industrial Development Corporation (KSIDC) envisages the production of 75 lakh litres of rectified spirit at Quilon.

Of the two private sector units, Rampur distillery has received an LI for an annual production of 460 kilolitres of malt spirit. Jagatjit Industries has been granted an LI for setting up additional facilities at Hamira and Kapurthala in Punjab for the manufacture of 20,000 kilolitres of IMFL including wines and liquors.

The lone entrepreneur, Mr. Anil of Madhya Pradesh, has received an LI for 3,500 kilolitres of IMFL, 1,500 kilolitres of ena (potable alcohol), 125 kilolitres of fusel oil and 2,500 kilolitres of stillage as by-products.

The LIs are, however, subject to special conditions. These include approval of the site of the project from the environmental angle by the competent State authority. A commitment by the entrepreneur to the State Government as well as the Centre that appropriate equipment would be installed for the prevention and control of pollution and finally, a certificate from the State Pollution Control Board that the proposal meets the environmental requirements and the equipment has been installed.

As for the raw materials such as damaged wheat and rice, procurement will have to be from or through the Food Corporation of India or from the recognised Central or State procurement agencies and not from the open market.

UB Petroproducts to produce polyols

UB Petroproducts, promoted in a joint sector by the UB Group and Tamil Nadu Industrial Development Corporation (TIDCO), proposes to manufacture two imported items, viz. polyether polyols and propylene glycols, with an annual capacity of 8,000 tonnes and 7,000 tonnes respectively. Besides, it will produce 12,000 tonnes of propylene oxide annually.

The project, costing Rs. 71 crores, is coming up at Manali, Madras, using propylene available from Madras Refineries. According to Dr. R.C. Gupta, Managing Director, no imported raw materials are required for the manufacture of these items. The project is expected to be on stream by April 1990.

The technology for the project is being supplied by Pressindustria, Switzerland and Montedipe, Italy. The latter will have an equity stake of 10 per cent in the project.

Montedipe is one of the leaders in the polyurethane industry in the world and has several operating plants for the manufacture of not only the above mentioned products but also other polyurethane chemicals like MDI/TDI and operates several "systems houses" for polyurethane.

Over 40 polyols and EO/PO condensate plants, based on the similar technology supplied by Pressindustria are working all over the world at present. Because of their unique design, in addition to superior product quality, these plants have had an excellent safety record unlike the conventionally designed plants which are prone to accidents.

In fact, more and more manufacturers of EO/PO condensates worldwide are switching over to the Pressindustria technology. Propylene oxide/propylene glycol technology is based on several similar size plants of Montedipe operating in Italy for the last 25 years. Hence, technology transfer is expected to be smooth, according to Dr. Gupta.

Polyether polyols are used for the manufacture of polyurethane foams having a wide range of applications. The properties of polyurethanes can be manipulated by appropriate formulations to manufacture flexible foam, semi-rigid foam, elastomers and surface coatings/paints. Flexible foams which form the bulk usage at present are used for mattresses, furniture, seatings etc.

Rigid foams find applications in heat and sound insulation in refrigerators, cold storages, industrial insulations, sandwich partition panels etc. Other applications include manufacture of automobile components, housing for electronic gadgets, footwear and as wood substitute.

Propylene glycols find extensive applications in the field of pharmaceuticals, foods, cosmetics and tobacco processing. It is used in fibre reinforced plastic for manufacture of corrosion resistant equipment -- both industrial and domestic -- boats, besides synthetic marble, polymer concrete etc.

Current level of demand for polyols is of the order of 12,000 tonnes and for propylene glycol 9,000 tonnes yearly. Demand for these products is growing at more than 15 per cent every year and with the indigenous availability and marketing service back-up planned by the company, it is expected to grow rapidly doubling in less than five years.

Montedipe has agreed to extend the necessary technical/marketing support, including supplies of MDI/TDI which, they hope, will speed up market development and enable the company to pioneer the polyurethane growth in the country and be number one.

The company proposes to raise the finance for the project by UB and its associates Rs. 6.20 crores (24.8 per cent), TIDCO Rs. 6.50 crores (26 per cent), Montedipe Rs. 2.50 crores (10 per cent) and Rs. 9.80 crores for public and others, making a total of Rs. 25 crores. Out of this, the issue for the public alone is Rs. 5.07 crores. The company is expected to make the public issue in September. The balance Rs. 46 crores for the project is tied up as term loans with financial institutions and commercial banks.

As the project is expected to give good returns even from the very first year of its operations, the Managing Director has estimated sales of Rs. 36 crores in 1990-91 with a pre-tax profit of Rs. 7 crores.

CHEMOX GROUP FARES WELL

Chemox group, consisting of Chemox Overseas Corp., Chemox Chemicals etc, has crossed the Rs. 70 crore turnover mark. Leader in the market, the group is dealing in many vital chemicals, solvents, bulk drugs, dyes and dye intermediates etc. The group has branched out its activities throughout India and has a staff of 130 persons.

The group's major activities include agencies and dealerships of government and semi-government agencies and corporate clients. Apart from the yearly contract under buy-back arrangements with over two dozen manufacturers, Chemox is also catering to the needs of almost all the sectors of industry.

Chemox also has a number of units in Maharashtra which manufacture bulk drugs. The group is also exporting bulk drugs mainly to European countries and within a short span of one year, the company has achieved an export turnover of more than Rs. 3 crores and plans to double it in the coming year. According to Mr. Shreeniwas Agarwal of Chemox, one bulk drug unit would be set up in Gujarat shortly, which would make a turnover of Rs. 25 crores.

Hoechst rabies vaccine plant by October

The largest tissue culture-based rabies accine plant in Asia, and the first in the ountry, set up by Hoechst India Ltd., Ankleshwar (Gujarat) is scheduled to ommence commercial production by October.

The unit which involves a capital outlay of around Rs. 3 crores will manufacture the purified chick embryo cell culture vaccine. The vaccine will be sold under the brand name Rabipur.

At the same time, the company's formulation plant (also at Ankleshwar) will commence operation by September or October. This plant also involves an investment of Rs. 3 crores for the first phase, and is likely to involve an additional Rs. 1.4 crores for the second phase.

The company has already decided to step up its expansion, diversification and modernisation plans in the coming years. According to reliable sources, these plans alone should account for capital expenditure of around Rs. 50 crores between now and the end of 1991.

During the current financial year (1989-90) the company has earmarked funds of around Rs. 16 crores, for these purposes. A bulk of these funds are expected to be invested in areas related to pharmaceuticals and agrochemicals. The company has already received a letter of intent (LI) for expansion of the capacity, for the manufacture of Isoproturon (a wheat weedicide) from the current 400 tonnes a year to 650 tonnes.

It has also received a LI for making rice weedicide, Arozin. The company has also started manufacturing ciclopriroxolamine (now sold under the brand name Eastrafen) an antifungal drug. Moreover, the company is also in the process of acquiring land for its hybrid and high-yielding seeds project. This is because company officials seem convinced that the seeds business should contribute to the organisation's bottom line substantially in the coming years.

The company has also applied for industrial licences to manufacture two veterinary drugs. These are berentil, a highly effective and well tolerated chemotherapeutic agent for the treatment of basesiosis and trypanosomiasis of animals, as well as tonophosphan, a highly effective non-toxic phosphorous preparation for the regulation of the metabolic processes in animals.

The company last year introduced several new products. These included drugs like trental, which activates brain cells and enables better retention of memory, and omnatax (sold overseas as Kleferone by Rousell) which is a fourth generation antibiotic.

In the coming years, the company hopes to produce human grade insulin via the biotechnology route. According to reliable sources, the modalities relating to the manufacture of this product are going on.

The company's decision to opt for the biotechnology route, say some informed sources, lies in the fact that the earlier method of extracting insulin from animals did not prove to be quite effective. This was because, it was discovered that the active ingredient in Indian animals did not match up to the level found in animals overseas.

Moreover, the biotechnology route is considered by many to be not only cost-effective in the long run, but also promises to be superior in terms of producing a better quality product than was possible along conventional lines.

The mood prevailing within company circles appears to be upbeat. They believe that the current year should reinforce the stand taken in the previous years that investment for making newer drugs in India ought to pay off in the long run. That is why, even when most pharmaceutical companies are complaining about squeezed margins on account of drug price control laws.

Hoechst is going ahead with making investments in setting up its formulations and agrochemicals units at Ankleshwar. This strategy should pay off in the coming years, they feel.

ALCOHOL SHORTAGE:

Rishra LDPE plant shut

Bindal Agro Chem Limited, a company belonging to the Oswal group, has closed down one of the two units of its Rishra LDPE plant in West Bengal in view of acute shortage of industrial alcohol. The company has not been getting any supply of the alcohol for the past 10 days. Uttar Pradesh, the major alcohol supplying state, has stopped movement of the chemical out of the state.

The unit which had been closed earlier too was commissioned only in June and was producing at the rate of 20 to 22 tonnes of LDPE a day.

The company has urged the West Bengal government to take up the matter with the Centre. The state excise commissioner, it is learnt, is to visit Delhi soon to request appropriate authorities there for release of special quota for the Rishra unit. From the company's side, the issue is being taken up with the UP government.

Bindal Agro Chem needs about one lakh litres of alcohol a day, or a little over 300 lakh litres annually. So far it has been given an allocation of about 265 lakh litres. Of this, the actual supply has been to the tune of 65 lakh litres. The bulk of supplies, over 200 lakh litres, is to come from Uttar Pradesh, and a small quantity, around 50 to 60 lakh litres, from Bihar.

Nothing has yet been received by the company from Bihar. This is because of the anomaly in the price structure. Although the cost of a litre of industrial alcohol should not exceed Rs. 2.43, distilleries in Bihar, it is reported, have been charging at the rate of about Rs. 3.50.

The Oswals, it might be recalled, bought the Rishra plant from ICI India Limited (then IEL Limited) last year at Rs. 14 crores. The plant was closed for nearly two years and was virtually reduced to junk. The new owner put in about Rs. 10 crores to revamp it.

GSFC NYLON UNIT GOES ON STREAM

The Rs. 119-crore nylon unit sponsored by Gujarat State Fertiliser Company (GSFC), near Surat, has gone on stream, according to Mr. A.M. Bhardwaj, Managing Director of Gujarat Nylons Ltd. The unit is located at Kossamba, backward area, and is in proximity of Surat, the country's biggest art-silk centre and a major consumer of nylon.

Mr. Bharadwaj said comparable units to Gujarat Nylons were Century Enka, Shree Synthetics, Baroda Rayon, J.K. Synthetics, JCT and Garware Nylon Ltd. However, he added, the unit had the advantage since it had installed the latest state-of-the-art machinery imported from Lurgi of West Germany. The unit would be able to make high-speed oriented yarn which fetched premium in the market.

At full capacity, Gujarat Nylons would produce 6,000 tonnes per annum. However, the company would be able to reach 100 per cent capacity in the second year of operation. At full capacity, the turnover of the company was expected to be Rs. 100 crores. Gujarat State Fertiliser Company had a stake of Rs. 27 crores in the plant. An amount of about Rs. 40 crores would be raised through equity out of which the public issue would be of the order of Rs. 11.10 crores.

As far as raw material was concerned, GSFC, being the producer of caprolactum, Gujarat Nylons was assured of continuing supplies. In fact, GSFC was the sole producer of caprolactam although FACT was reported to start caprolactam production soon. Mr. Bharadwaj added the company's product had been well received and in due course it would install a polycondensation plant as well.

IPCL's shutdown postponed

Indian Petrochemicals Corporation Ltd. (IPCL) has planned a major expansion of its production capacity for some of its solvents at its Baroda complex. The estimated investment on this expansion, which is expected to be completed by December this year, is about Rs. 71 crores.

The company would be expanding its production capacity for xylene to 96,000 tonnes. The present capacity for xylenes at its solvent plant is only 37,000 tonnes. According to Mr. Hasmukh Shah, chairman of IPCL, with this expansion the company will be self sufficient in paraxylene while in orthoxylene self sufficiency will be achieved to the extent of 80 per cent.

The proposed shut down of the solvent plant to undertake this expansion is now being postponed from August to September in response to the plea of the pesticide formulators. Pesticide formulators who are using solvent C-9 and mixed xylene which are also manufactured at the solvent plant have expressed concern of a scarcity of this intermediate in the event of a shut down in August, when the kharif season is at its peak.

IPCL is the main supplier of these solvents to pesticides' manufacturers although plants of Indian Oil Corporation and Bongaigaon refinery in Assam are also manufacturing them. The supplies from the Assam plants are however totally irregular now as the road and railway transport systems are paralysed due to floods.

Mr. Shah said that there should not be any concern for the pesticide industry as IPCL has already geared itself to produce 1000 tonnes of solvent C-9 during August. And out of this 800 tonnes could be released to the pesticide sector at the rate of 400 tonnes per month during August and September.

IPCL has already been releasing a higher quantity of 494 tonnes of solvent C-9 per month during April-July period of 1989 as against a quantity of 304 tonnes per month during the same period of the previous year. In the case of xylenes, IPCL would be releasing 400 tonnes each during August and September. The demand for xylenes from the pesticides sector is to the tune of 600 tonnes per month.

As the large units like Bayer, Bharat Pulverising, Indofil, Sandoz, etc. are planning bulk import of xylenes, IPCL will be releasing xylenes only to small scale sector during the current season. The large units are stated to have already organised import of 6,500 tonnes of orthoxylene and mixed xylene. Some quantities have already arrived.

COMMITTEE ON PLASTICULTURE RECONSTITUTED

The Government has reconstituted the National Committee on the use of Plasticulture (NCPC) to make it more effective and purposeful and to direct its efforts in a consolidated manner for the rapid use of plastics in agriculture.

The reconsituted Committee is headed by Mr. M.S. Gill, Secretary, Chemicals and Petrochemicals, and includes the Director-General, Department of Indian Council of Agricultural Research, and two Vice-Chancellors of Agricultural Universities.

The Committee will prepare plans for the use of plastics in agriculture to increase agricultural productivity and optimise the use of water resources. It will also recommend measures such as fiscal policy, subsidies and assistance to farmers for promotion of use of plastics in agriculture.

The Committee will also suggest various strategies for adoption of drip sprinklers, irrigation, green houses, multching and to arrange promotion of research and development to build data bases to assist in prescribing quality standards of plastics used in agriculture and water management.

The Committee will supervise and monitor the implementation of plasticulture district programmes and plasticulture development centres. The Government proposes to introduce plasticulture programmes in 15 districts at a cost of Rs. 50 crores.

According to official sources, the demand for plastic crates is growing. The Indian Petrochemicals Corpn. Ltd. had provided 26,000 plastic crates free of cost to Himachal Pradesh, Jammu and Kashmir and Punjab last year.

It has been estimated that the demand will go up to three lakh crates, for which a scheme is being worked out. It was also proposed to start plastic processing centres in a phased manner. The Indian Petrochemicals Corporation is to be the nodal agency for this purpose. Equipment will be provided by the processors and 60 per cent of the share will be given by the Centre.

Sources said India proposes to host an International Plastics Conference this year, and that the Committee has been reconstituted keeping all these developments in mind. The Centre is keen to ensure that plastics are readily available for farmers to promote various plasticulture applications. A pilot project has been prepared, for which the Hoshiarpur district in Punjab has been chosen.

GOVERNMENT WANTS DMT PRICE FIXED AT Rs. 28,200

The government is understood to have indicated a fair price of Rs. 28,200 per tonne for DMT, the basic raw material for the polyester industry. Bombay Dyeing is the only DMT producer in the private sector in the country. The other two producers IPCL and Bongaigaon Refineries, are in the public sector. It might be recalled that the Association of Synthetic Fibre Industry had requested Bombay Dyeing to reduce the price of DMT in view of the fall in the price of paraxylene in the international market.

hloroquin in short supply, prices spurt

Two vital bulk drugs namely chlor-in, an anti-malaria drug and paracet-ol, a widely used mild analgesic, are acute short supply. The prices of both e drugs have shot up in the market in last few weeks. Demand for chlor-uin has suddenly gone up in recent eeks following the outbreak of malaria different parts of the country. Ran-xy, the leading manufacturer of the ug, is finding it difficult to meet the rging demand.

Production by some of the small scale ug units are in small quantities. The ice of the drug has risen in the market Rs. 800 a kg already from a level of s. 500 only a few months ago. The n-availability of the drug is being felt some of the government-run hospi-ls in many small towns in the coun-y. The pharmaceutical trade still has me stocks with it.

According to industry sources, clo-re of some of the drug units making loroquin during last year is another ason for the current scarcity. Last year, e demand for the drug had fallen arply and some of the drug units were serious financial crisis.

In the case of paracetamol, the short-ge is caused by the reduced availabil-y of paranitrochlorobenzene (PNCB), e penultimate intermediate for para-tamol. The sources said that Hindu-an Organic Chemicals, the largest anufacturer of PNCB, has not been pplying the intermediate to the drug nits regularly.

With lower production, the drug is eing traded at Rs. 135 per kg in the arket now. The government fixed ice for the drug is Rs. 114 per kg. The ources said that many hospitals do not ave stocks of paracetamol. The drug is lso used for the treatment of malaria. he supply of PNCB to drug units has een restricted for several months ear-er in the wake of a benzene shortage. ow, the Central government is reported to have issued a directive to HOC to give priority in supply of PNCB to pesticides and export-oriented units.

A number of paracetamol units are, thus, forced to curtail production resulting in scarcity and high price of the drug. The drug is being sold in the market at a price of Rs. 160 a kg against a price of Rs. 120 a kg a few months ago. Paracetamol units require 2,400 tonnes of PNCB per annum whereas the combined demand from the pesticides and dyestuff sectors is placed at 1,500 tonnes. HOC has a capacity to manufacture 8,000 tonnes of PNCB while the two other small units make a total of 300 tonnes of PNCB.

ROTARY AWARD TO Dr. K.H. GHARDA

The Rotary Club of Bombay West, as a part of its Vocational Awards Programme will be honouring Dr. Keki H. Gharda for his outstanding achievements as a Chemical Engineer and his contribution towards Business and Industry.

The Award will be presented to Dr. Gharda during the Club's regular meeting on 9th August 1989 at Rotary Service Centre, Juhu-Tara Road, Juhu.

Dr. Gharda is the Chairman and Managing Director of Gharda Chemicals Ltd. with a turnover of Rs. 50 crores including Rs. 10 crores of exports. The company was started by Dr. Gharda as a Small Scale Company, about 25 years ago with a meagre capital of Rs. 50,000 and through the sound practice of chemical engineering and organic chemistry and through sustained research and development work, Gharda Chemicals Limited have achieved a unique place in the Indian Chemical Industry scene. Gharda Chemicals Ltd. projects a turnover of Rs. 100 crores during the next 2-3 years.

Gujarat renews demand for gas

The Gujarat government has renewed its efforts to persuade the Centre to allocate gas from the Gandhar fields for its various projects, including three gas-based power plants.

A fresh memorandum, submitted recently by the chief minister of Gujarat, Mr. Amarsinh Choudhary, to the Prime Minister and the Union Petroleum Minister, has made out a case for the utilisation of the entire quantity of gas both from the Gandhar and mid and South Tapti gas fields within the State.

The memorandum has pointed out to the Centre that the power situation in Gujarat would deteriorate further, having an adverse effect on both the industrial and agricultural growth. As it is, there is a massive gap between the demand and supply of power, which is estimated to go up to a staggering 1,832 mw by the end of the Eighth Plan period. Giving the whole issue a political tinge, it has been stated that the rejection of its earlier proposals had resulted in considerable disappointment in the State and if the gas produced from the Gandhar fields is not allocated for the State's needs, there would be "serious repurcussions, resentment and discontentment among the people".

According to the new memorandum, revised projections indicate that the quantity of gas available from the Gandhar gas fields is estimated at five million cubic metres a day (MCMD) by 1992-93, which would go up to 12 to 15 MCMD by 1998. Given the large quantity of gas, which is to be made available, the State Government has proposed that it be allocated enough gas for the setting up of three gas-based power projects, for supplying piped gas to Ahmedabad and Surat and for use in industries.

To buttress its case further, the state government has presented the Centre with several technical details, all of which point to the fact that it would be more feasible and economical to utilise the gas within the state. The memorandum has said the gas to be produced from the Gandhar field is very rich in C2/C3 content, while the gas produced from the south Bassein field and transported through the HBJ pipeline is comparatively lean. Thus, mixing the two gases, it has been pointed out, will mean that the gas will get diluted. This would also mean that the capital as well as operating cost for C2/C3 and LPG recovery would be higher if Gandhar gas is mixed with the HBJ gas. In addition, it would also mean a substantial loss of ethylene and propylene, which can cost the exchequer anything between Rs. 24 to Rs. 63 crores per annum.

D.N. SHROFF IS DEAD

Mr. Dhirubhai N. Shroff, president of the Silk and Art Silk Mills' Research Association died at Bombay on July 25. He was the chief architect of the man-made textile industry in the country and was the founder of Silk & Art Silk Mills' Association. He served on its board of directors from 1939 to 1965.

Scope to boost oilfield chemicals export

A vast export market for oilfield chemicals will open up for the Indian industry if the Government insists on counter trade in chemicals against import of crude and petroleum products, according to industry sources.

India imports about Rs. 3,000 crores worth of crude and petroleum products from the Gulf and the Soviet Union. There is no estimate on their requirement of drilling chemicals but it should be worth several hundreds of crores of rupees. For producing about 30 million tonnes of oil, ONGC claims to be using Rs. 135 crores worth of chemicals a year.

The USSR produces about 600 million tonnes, China 115 million tonnes and the Gulf countries' output exceeds 700 million tonnes. Going by ONGC's chemical consumption for producing 30 million tonnes of oil, consumption of the oil industry in the USSR and the Gulf nations can well be imagined.

Two delegations, one from India to the USSR and the second from the USSR to India, could not result in making available a list of oilfield chemicals required by the USSR. Industry sources say that to get concrete results, major trading houses with offices in Moscow, like Chinar, Chemitex and Usha Continental be made the nodal agency.

The USSR already has arrangements for preferential purchase of chemicals with West European manufacturers like ICI and Rhone Poulenc in return for sale of gas. It should also not be difficult to compel international drilling companies like Chevron, who are being awarded drilling rights in Indian offshore blocks, to use Indian chemicals for their operations in Asia and Africa.

Supplies made by Indian units to foreign drilling firms are not yet treated as exports. Exports of chemicals to the Gulf and Singapore can be promoted once the foreign companies are persuaded to use Indian chemicals in their operations here. These companies should not be allowed to perpetually import chemicals developed and available here for over a decade, the industry feels.

To make India's oil exploration closer to international cost, the Ministry of Commerce announced a deemed export scheme in 1983. ONGC, however, has been lukewarm to the indigenisation drive and there have been widespread allegations of corruption in purchase. In fact, de-emulsifiers, antioxidants, corrosion inhibitors, surfactants and glycol ethers are used by other sectors of petroleum business like refining, brake fluids and lubes. They are satisfied with the quality of the Indian material.

Indeed, import substitution of much greater value than ONGC purchases has been achieved in these sectors with much less discussion. Similarly, domestic producers have fewer problems with Oil India Ltd., which, they say, has a better business culture than ONGC. It has been charged that domestic producers are charging high prices, but in most cases, this can be traced to the prices of inputs like naphtha which are fixed by the Government.

ONGC has made a demand projection and indigenisation status of oilfield chemicals which leaves much to be desired. The list excludes items like sodium bichromate, phosphate and potassium chloride. Because of pressures from above, decisions of ONGC's testing labs are often influenced by considerations other than quality. The industry would like independent research labs to be associated with the testing. Major Indian companies have lost money on sales to Oil and Natural Gas Commission. The case of Hindustan Magcobar is an eye-opener. The company obtains more orders from the US than from ONGC.

OIL HUNT: TALKS WITH CHEVRON TO REVIEW PROGRESS

The Petroleum Secretary, Mr. H.K. Khan held discussions on broad issues relating to oil exploration contracts i India with Mr. John H. Silcox, Pres dent of Chevron Overseas Petroleu Inc., on August 2. The meeting was als attended by Mr. L.T. Nierth, JR., Vic President of Texaco Internationa Petroleum Company and the Oil an Natural Gas Commission (ONGC Vice-Chairman, Mr. P.K. Chandra.

Chevron Texaco already has fou production sharing exploration contract with ONGC and are drilling a well i the Krishna-Godavari basin. The com pany proposes to drill one more well i Palar offshore soon after the drilling i Krishna-Godavari is completed, officia sources said.

The meeting also reviewed the progress of work in these four blocks. The visiting officials indicated that numbe of prospects had been identified in these blocks and were hopeful of success in the area. Chevron Texaco also showed keen interest for more exploration and production contracts in the oil sector and it was agreed that further discussions would be held in this regard.

THREE MT REFINERY FOR ASSAM APPROVED

The Centre has agreed to set up a three-million tonne refinery in Assam, an official release said. The refinery --an important clause in the Assam accord -- would be set up shortly by a new company with its head office in Assam and capital participation of the State Government, the release said.

The Centre had constituted a technical committee under the chairmanship of the adviser (refinery), Ministry of Petroleum and Natural Gas, Mr. S.N. Mathur, along with representatives from the State Government, Planning Commission and the oil companies for recommending a suitable site for the proposed refinery. The question of site selection would be decided in the interest of Assam on purely objective considerations, the release said. The State Government has appealed to the people to help create a constructive atmosphere for setting up the refinery.

Garware granted LI for X-ray films

Garware Plastics and Polyester has een granted a letter of intent to manfacture six million square metres of olyester-based X-ray and graphic art lm, using in-house technology develped by the company.

The company had made an applicaion for the project way back in 1984. At present, only Hindustan Photo Films (HPF), the public sector undertaking, manufactures X-ray films using acetate base. The cost of the HPF project to produce polyester based X-ray film in collabbration with Du Pont is estimated at Rs. 200 crores, including the cost of training at Rs. 20 crores and technology and know-how at Rs. 80 crores, both in foreign exchange.

According to Mr. Shashikant B. Garware, chairman and managing director, Garware Polyester, the cost of the company's X-ray project will be Rs. 60 crores. Moreover, the company will be able to use its base film to the extent of 1,500 tonnes, whereas HPF will either have to import the base film or buy from Garware.

The work on HPF project has started more than a year ago, and the project is expected to go on stream in the next three or four years. As against this, Garware Polyester has already installed a pilot plant, and its project will take about two years to get operational.

It may be recalled that there was a lot of controversy over the application of Garware Polyester's project. With the clearance of its project, the government has permitted, for the first time, the entry of private sector in the industry. According to Mr. Garware, introduction of X-ray film in India with polyester film base heralds a new era, bringing Indian technology in this field at par with advanced countries in the world. All over the world, polyester-based X-ray film has replaced the conventional acetate-based X-ray film because of clear superiority in quality.

Indigenous know-how

The company has spent around Rs. 5 crores on R and D. Its photo film project is based on indigenous know-how developed by its R and D division, which is recognised by the Department of Science and Technology of the government of India.

During the last three years, X-ray film made the company in its own R and D bench plant was extensively tested by eminent radiologists all over the country. Reputed hospitals have also vouchsafed the quality of its X-ray film. Polyester film and sun control film developed by the company earlier have already established success in the U.S. and Western Europe. The company has also been manufacturing video tapes and cassettes using polyester film.

According to Mr. Garware, the new project is the most logical step whereby the company can increase and broaden its product range based on polyester film. The financing of the project will be decided soon. A decision also will have to be taken whether the project should be a separate division of Garware Polyester or a separate company should be formed. According to Mr. Garware, in either case, shareholders of Garware Polyester should stand to benefit.

NEW PROJECT FOR PVC PROFILES

The housing boom and the growing concern for depleting forest resources have brought in its wake a new industry -- plastic extrusion door and window frames. Sintex, the company which is almost synonymous with plastic water tanks, has set up a unit to manufacture extrusion products. Six more companies are awaiting government clearance for similar projects.

Kedwin Expro, a Calcutta-based company promoted by Mr. B.L. Kedia, is most likely to be the second company, after Sintex, which will start commercial production of plastic extruded door and window frames by September this year from its plant at Bilaspur in Madhya Pradesh. The Sintex project had gone on stream towards the end of last year.

Kedwin Expro has entered into a technical collaboration agreement with Hans Weber of West Germany under which it is setting up the plant. The total project cost of Rs. 3.22 crores is being financed by loans of Rs. 1.72 crores from financial institutions and an equity capital of Rs. 1.50 crores. The promoter's contribution in the equity will be Rs. 60 lakhs while the balance is to be offered to the public in another 2 months.

Mr. Kedia is banking heavily on his pricing policy to compete with the established manufacturers of extruded PVC profiles. As per his project report, submitted to the financial institutions the viability of his unit is ensured if the products are sold at a minimum price of Rs. 50 per square foot. At a price of Rs. 70 per square foot the unit becomes profitable. The established firms are pricing their products at about Rs. 200 per square foot which does not compare favourably with quality wood or aluminium prices of about Rs. 120 and Rs. 140 per square foot respectively, according to Mr. Kedia. He thus made it clear that his company would follow a conservative pricing policy.

Marketing is not seen as a major problem as the company is negotiating with the Delhi Development Authority for the bulk supply of door and window frames for their housing projects. The railways too have shown interest in having PVC windows for their new compartments. At this price the company, again as per the project report will generate a turnover of Rs. 4 crores by the third year operating at full capacity of 600 tonnes per annum. The net profit should be about Rs. 21 lakhs. The bulk of the raw material requirement, PVC compounds, will be imported, costing the company Rs. 90 lakhs in foreign exchange per annum as IPCL the main supplier in India is unable to cope with the increased demand for compounds. PVC compounds were recently placed under OGL and even after payment of import duties the landed cost per kg of compound comes to Rs. 30 against the indigenous price of Rs. 35 a kg.

rlabs to commence MAP production soon

Arlabs Ltd., with a turnover of Rs. 20 ores in 1988-89, is embarking on a ajor modernisation and expansion lan. The company expects to begin the anufacture of meta amino phenol, hich is used for making bulk chemials, dyes and pesticides, in the next two nonths according to Mr. P.H. Khatiwla, managing director.

The new manufacturing facility is coming up at the company's existing premises at a cost of Rs. 2.75 crores. While ICICI, has financed the project o the extent of Rs. 2.10 crores, the balance is being met from internal accruals. The total capacity of the new plant is 750 tonnes and the company expects to achieve 80% capacity in the first year itself. The company plans to export, all the meta amino phenol produced by it. Orders from Germany, Japan and some European countries, have already been received. The total exports for the first year are put at Rs. 12 crores.

The only other manufacturer making meta amino phenol in the country is Hindustan Organic Chemicals (HOC). While the domestic demand is only around 100 tonnes, the export potential is vast, according to Mr. Rajan Sinha, marketing manager. Incidentally, the technology for the manufacture of the bulk chemical is indigenous. Besides, the company plans to manufacture nitrobenzene after the monsoon at the same premises.

The company is also undertaking modernisation of its existing plants at Bhor, Poona at a cost of Rs. 3 crores, which will take two to three years for completion.

The company proposes to set up another company -- Synthone Chemicals -- for the manufacture of beta naphthol and bon acid at a cost of Rs. 11.5 crores. To part-finance this project, a public issue of Rs. 5 crores of fully convertible debentures will be made sometime in October 1989.

The company had received a turnover of Rs. 15.56 crores for the nine-month period ended March 1989, against a turnover of Rs. 11.89 crores recorded for the twelve-month period ended June 1988. The turnover for three-month period April-June 1989 was Rs. 5.5 crores and the expected turnover for the current year is around Rs. 36 crores.

After the new projects are implemented, the turnover is expected to touch Rs. 100 crores by 1991. The gross profit for the nine-month period ended March 1989 was Rs. 1.35 crores, against Rs.92.96 lakhs achieved for the 12-month period ended June 1988.

The company is awaiting the government's clearance to take up manufacture of paranitrochlorobenzene; two drug intermediates, some more pesticides and their intermediates, dye intermediates and corrosion inhibitors.

The capacity of existing facilities for the manufacture of pesticide intermediates like ortho phenylene diamine are being doubled both for domestic supply and also for export.

Apart from dyes and chemicals, the company is going in for the manufacture of photographic chemicals. It proposes to introduce "Derma Color" a camouflage system, in collaboraton with Cryola of Germany. This system will be used as make-up for artists.

The company has fared well in the export market, with 32 per cent of its turnover in 1987-88 accounting for exports.

ANIL CHEMICALS

Anil Chemicals Ltd., has completed its 100th bulk loaded explosives blast at the mines of Northern Coalfields Ltd., at Sangrauli. In these hundred blasts 3,580 tonnes of bulk explosives was blasted and the single largest blast was as high as 130 tonnes.

No pesticide residues in Indian apples

Studies on pesticide residues conducted over the last 10-15 years by the Indian Council of Agricultural Research have revealed that in a majority of samples, residue levels were below the prescribed limits. This was stated in the Lok Sabha by the Minister of State for Health & Family Welfare, Ms. Saroj Khaparde while replying to a question raised in the lower house. The question was prompted by recent reports of contamination of apples in the U.S. and Chile.

Replying to yet another question the minister stated that in a survey conducted by the Directorate General of Health Services during the year 1987, a total of 648 samples of various commodities of food collected from the farmers and markets were analysed mainly for DDT and BMC. The results are shown below:

Statement showing name of each commodity, number of samples analysed & number of samples exceeding prescribed limit

Commodity (Name)	No. of samples analysed	No. of samples exceeding prescribed limit
Vegetable	231	1
Fruits	181	1
Cereals	74	6*
Pulses	103	2*
Vegetable oils	52	-
Dairy products	7	6
Total	648	16

* 33 samples of cereals & 31 samples of pulses also showed presence of DDT for which no tolerance limit has been prescribed. However, the level was below the detectable level in most of the rice and wheat flour samples.

PATALGANGA UNITS SHUT: FLOODS

Following gale and flooding of the Patalganga river, in Raigad district, a number of leading industrial units, including Reliance, Bombay Dyeing, Orkay Silk Mills and the public sector Hindustan Organic Chemicals, have suspended operations. This is the first time the Patalganga petrochemical industrial complex has been affected in this manner since it was carved out in the late seventies.

The heavy rains of July 24, followed by gale have caused enormous damage to the roads, power distribution system, transformers and water supply. At some places the power was cut off to prevent short circuits and fires.

The industrial complex produces some of the most hazardous chemicals and any laxity on the part of the industrial units could lead to accidents. It is learnt from government sources that the Raigad collectorate is taking steps to prevent any mishap. However, several villages in the vicinity have, reportedly, been washed away in the floods and over 100 people have lost their lives.

Industry sources said that the water supply has been cut off following clogging of the water pumps and distribution systems. Further, it is learnt that several manufacturing units have been flooded even as the production process was on. "It is too early to make an assessment of the damage to the plant and machinery", a government source said in Bombay. However, it was made clear that there was "no great damage" nor any loss of life in or around the plants in the Patalganga complex.

Reliance badly hit

Reliance Industries Ltd. appears to be the worst hit in the recent rains which hit Bombay and neighbouring districts. The production of vital raw materials like paraxylene, LAB, PTA, polyester fibre and filament yarn have all been suspended.

The exact extent of damage was now known. According to one source, water has seeped into the computerised production control and monitoring system which may have to be replaced. Indefinite stoppage of production is likely to throw the textile industry into a major crisis. The industry has been reeling under high input prices and further price rise induced by shortages wil make matters worse, consumers fear. Raw materials like PTA are not readily available in the international spot market.

Other companies like Orkay and Bombay Dyeing, situated on higher ground in Patalganga have not been affected much and are expected to resume production soon. A spokesman of Hindustan Organic Chemicals which has its plant in the neighbouring Rasayani village said that following the resumption of power and municipal water supply, the plants are being started one by one.

Work at Nagothane, also in Raigad district, where Indian Petrochemicals Corporation Ltd. is setting up a gas cracker unit, has been affected but the situation is not so bad, according to an IPCL source. Some workers have been fleeing the site in the wake of the rains but IPCL is persuading them to stay on.

IPCL has made arrangements for supply of food, medicines and other essential items for the workers. In Patalganga too, the Patalganga and Rasayani Industries Association (PRIA) is trying to help rehabilitate workers whose hutments have perished in the rains.

Yarn prices soar

Prices of polyester fibre, yarn and texturised yarn have started skyrocketing following the rumours that the working at major production plants at Patalganga has been adversely affected by flooding.

The price of texturised yarn has shot up from Rs. 175 to Rs. 182 per kg and market circles expect this to go upto Rs. 200 in next few days. Similarly the prices of PSF, POY and PFY is also likely to follow suit.

According to market sources, the supply position of texturised yarn POY and PFY will become tight due to disruption of production at Reliance and Orkay. The non-availability of DMT from Bombay Dyeing will also affect the working of other polyester manufacturers.

Incidence of consignment tax decried

In a representation to the Finance Minister, Shri S.B. Chavan, the Pesticide Formulators Association of India SSI have pleaded for a reconsideration of plans to impose a consignment tax on transfer of various pesticides. Highlighting the inflationary pressures, such a tax will bring about, the association has pleaded that vital imputs like pesticides, seeds and fertilisers be spared from such a levy. The tax would create regional imbalances in pricing and supply and would upset the existing pattern of interstate business by division of the Indian market into unequal segments.

Office bearers

Six members of the managing committee of the Association were elected at the Annual General Meeting held on June 30, 1989.

The reconstituted managing committee is as under:

Shri Pradeep P. Dave -- President
Shri Deepak P. Shah -- Vice President
Shri Girish C. Choksey -- Hon. Secretary
Dr. H. Mohan Rao -- Jt. Secretary
Shri Dilip B. Sanghvi -- Treasurer
Shri Chetan C. Shah -- Member
Mrs. Elizabeth P. Srivastava -- Member
Shri Rasik B. Bhatt -- Member
Shri Dinanath Chaturvedi -- Member
Shri Kaushik C. Shah -- Member

CEPHALEXIN PRICE FALLS BY Rs. 700

The price of cephalexin, an advanced antibiotic, has crashed to Rs. 4,300 a kg in the market from the level of Rs. 5,000 a kg a few months ago. The drug has been in great demand until recently.

Industry sources at Bombay said that excess production by the drug units is the sole reason for the drop in the price. There are five leading manufacturers of the drug namely Ranbaxy, Lupin, Lyka, Standard Organics and Armour. The production capacity for the drug with these drug units range from 30 to 50 tonnes per annum. The total country's requirement is placed at 70 to 80 tonnes with a 10 to 15 per cent annual growth rate. Cephalexin manufacturers are facing the pressure on its price despite the fact that most of them are producing only 50 per cent of their licensed capacity and some of them are having good export orders.

USSR TO BUY MEDICINES FROM INDIA

The Soviet Union has agreed to make bulk purchase of medicines from India in the near future, the President of the Federation of Indian Export Organisations, Mr. Ramu S. Deora, said. Out of the 500 million roubles allocation to Soviet Health Ministry by the state to buy medicines on an emergency basis from foreign countries, India's share will be 175 million roubles. The Soviet decision has been taken to overcome the acute shortage of various types of medicines and equipment.

TACKLING SHORTAGE OF PHOSPHATIC FERTILISERS

FAI details long-term strategy

The demand for phosphatic fertilisers will far exceed the estimated production and there will be a gap of 1.7 million tonnes, by the end of the Eighth Plan. According to the Fertiliser Association of India (FAI), concerted efforts are required to identify a long-term strategy to bring about self-reliance in phosphatic fertiliser production.

FAI has recommended that research and development activities must be accelerated on possible utilisation of low-grade indigenous rock phosphate directly or through economic beneficiation for use as a feedstock in phosphate industry. Adequate financial assistance as grant-in-aid should be provided to Indian organisations which have already made progress in this direction and their work shows promise for optimal commercial exploitation of indigenous raw material.

Considering the anticipated tight supply of sulphur in the world market, efforts need to be intensified to utilise the large available resources of pyrites in the country. In view of the increasing requirements of rock phosphate, essentially imported, broad-basing of supply sources must be initiated.

Considering the economics, the use of direct application of rock phosphate should be maximised wherever suitable. The existing SSP (single super phosphate) plant capacity must be fully utilised and further expansion of SSP capacity should be undertaken. Techno-economic evaluation of setting up large SSP capacity (50,000 to 1,00,000 tonnes of P_2O_5 per annum) in one location or setting up mother sulphuric acid plant and supplying to a cluster of SSP units needs to be carried out.

To reduce dependence of imported sulphur, greater emphasis should be laid on increasing the production of nitrophosphate in the country. Products having 50 to 60 per cent water soluble P_2O_5 should be adequate for the purpose.

Output from the existing phos-acid plants in the country must be maximised. Debottlenecking, expansion and modernisation of existing phos-acid plants should be exploited to increase domestic phos-acid availability. The imported raw materials like rock and sulphur should preferably be transported through Indian flagship vessels to achieve saving in foreign exchange.

Planning domestic phosphatic fertiliser production from imported rock phosphate and sulphur would be favourable in terms of foreign exchange outgo, as compared to importing phos-acid and therefore more medium and large size phos-acid production facilities should be set up within the country.

Setting up of major phos-acid production facilities in locations where DAP (di-ammonium phosphate) plants are already in existence, with substantial requirement of phos-acid, should be preferred.

The environmental hazards from phosphatic production facilities are not technological. The waste products like gypsum and fluorine from phosphatic production facilities should be utilised to produce useful commercial products. Suitable joint ventures abroad with buy-back arrangements could be considered even for raw materials like rock phosphate and intermediates like phos-acid and fertiliser products like DAP.

As a long-term strategy, India's phosphatic fertiliser requirements should prefereably be met with at least 40 per cent from domestic production, about 35 per cent from joint ventures abroad with buy-back arrangement and the balance from imported phosphatic fertiliser from the open market.

Long term stable policy urged

Shri Vijay V. Merchant, President, he All India Plastics Manufacturers' ssociation has issued the following tatement to the Press:

"As you will remember right since une 1987 there was a continuous pward trend in polymer prices world-vide and by April 1988 the matter ecame so serious that some of the najor overseas producing countries ither clamped quotas for export of esins or ensured that export prices of polymers were 20% to 25% higher than local prices, dealing severe blows to the Indian Plastics Processing Industry which was dependent on 50% of its polymers through imports. West European producers completely closed doors to overseas buyers in Third World Countries.

Whereas International Prices of HDPE went up from $850 in June 1987 to $1350 in July 1988 despite repeated pleadings by the processors, the equipment manufacturers, ancillary suppliers during the whole of 1988, the Government pleaded its inability to rationalise import duties which were advalorem at 114.5% for HDPE and close to 100% for all other polymers. The results as you all know was a negative growth in 1988/89 and IPCL, the largest polymer supplier, reported almost 35% to 40% of its customers had failed to lift their quotas for entire third quarter, due to high prices. Several SSI Units reported losses or started falling sick by 1988 end. The culprit: HIGH POLYMER PRICES TO PROCESSORS. The end users of plastic products could not accept such costs any more and the capacity utilisation dropped in the processing sector.

In 1987 March, the Hon. Prime Minister Shri Rajiv Gandhi who presented the budget, if you will recollect, stated, he felt the price of plastics were high in India and should be "brought down" to serve people in farms and factories.

Very briefly the polymer costs then were per ton:

HDPE	Rs. 24,300
LDPE	Rs. 22,500
PVC	Rs. 18,000
PP	Rs. 25,500
Polystyrene	Rs. 31,600

Ever since then local prices continuously went up and never down and today they are 25% to 45% higher in 2 years.

HD	Rs. 32,000
LD	Rs. 33,000
PVC	Rs. 25,000
PP	Rs. 31,000
Polystyrene	Rs. 39,800

For a decade no major capacities have been added in India but with record operating results all the polymer units have asked for permission to expand today as returns are the highest and the market can be enormous.

With new demands from developing Asian countries from 2nd quarter of 1987 alongwith the surge in demand from West Europe and America, almost all moth-balled plants in Japan and the West were recommissioned and several European producers successfully completed debottlenecking in 1988 adding to the new production from Saudi Arabia, Korea, Taiwan and Singapore.

China factor brings temporary downtrend

After bumper prices and production at all petrochem. plants, in each and every corner of the world, since May 1989 there has been a price downtrend outside India. One of the shocks was China which first reported strains on its exchange reserves in November/December 1988 and then June 1989 experienced political revolt with a showdown at Tinanem Square by the Liberals. China almost withdrew from bulk imports by March 1989 leaving huge inventories with large international traders and producers. The major producers outside West Europe and America cannot afford a slow down. They are willing to sell to us at 30% and 40% below October 1988 peak prices. By the time, the polymers with reduced prices reach Indian factories, it will be August 1989 end, as it takes 8/12 weeks for the complete cycle of imports from indent to shipment to delivery to be over.

At current rupee/dollar rates and duties the landed costs of lower priced polymers from abroad is still higher than 1987 March prices to Indian processors (Table 1 and Table 2). The Prime Minister had said 1987 March prices were high, so do we now take them still higher or use polymerrs for wider application to meet the needs of the common man, like the rest of the world?

Table-1
Landed cost of imported polymers 1987 & 1989

Material	Cost March '87	Cost June '89	Higher by
HD	Rs. 22,790	Rs. 30,630	34.4%
LD	Rs. 23,590	Rs. 23,702	-
PVC	Rs. 15,050	Rs. 28,177	87.0%
PP	Rs. 23,155	Rs. 31,354	35.4%

Table-2
Prices of Domestic Polymer producers

Material	March '87 Prices	June '89 Prices	Increase '87 to '89
LDPE	Rs. 22,028	Rs. 33,000	+ 49.6%
HDPE	Rs. 24,354	Rs. 32,022	+ 32.0%
PVC	Rs. 18,000	Rs. 25,000	+ 39.0%
PP	Rs. 25,056	Rs. 31,000	+ 24.0%
HIPS	Rs. 31,680	Rs. 39,800	+ 26.0%

We have some authentic data on China, our neighbour, which did not have pioneers putting polyethylene plants as we had in the '60s, but even then betwen 1982 and 1989 increased domestic polyethylene production to almost a million tonnes and processed almost 1.75 million tonnes of PE in 1988. Totally it processes almost 3 million tonnes of plastics against our 0.7 million tonnes in 1988. Two of their major polymer development areas are

films and woven sacks. Both of these have a very important use in increasing yield from Agriculture important to us also as also 'Exports', earning them large foreign exchange. (We have some xerox copies of the recent reports from China. vis-a-vis PVC and Polyethylene). The withdrawal of China is temporary and soon it will again restart polymer purchases from world sources.

Long term policy -- prices and availability

Having realised the tremendous value of polymers as a vital ingredient for agricultural and industrial development and the serious consequences of raising costs high and seeing fall in consumption and applications, there is no honest suggestion but to keep polymer prices reasonable in India.

Today at 7 lakhs ton consumption of virgin polymers the revenue to the Government is Rs. 1,200 crores, by 1994/95 revenue will be Rs. 2,500 crores when projected consumption will be 17 lakhs tons. But besides the revenue to the exchequer a large tonnage of processing will yield many more benefits in villages, towns and cities aand help generate much more income and employment besides accelerating industrial growth and technical advancement. If the per capita income in U.S.A. is $18000 and the polymers cost $0.85 per kg. can we have wider use of plastics in India by pricing polymers @Rs. 36 or $2.20 per kg. with our average per capita income mere $300? For speedy growth our final polymer prices must not go beyond Rs. 20 to Rs. 24 per kg. to processors or else we price important new and wider applications out of reach. As regards availability of polymers the earlier we build world scale plants the better -- this will help reduce imports and hence save foreign exchange at the same time help increase yields in agriculture, save natural resources and help generate wealth.

Protection to whom and at what cost

After the 1978 IPCL complex at Baroda for 10 years we have not had any major petrochem unit. The plants of the 60s making LDPE at Rishra and Chembur, HDPE and PVC at Thane and Styrene at Jogeshwari and Vishakapatnam are tiny and per unit costs are bound to be high, technologies are old -- do we keep building higher tariff walls each time the world scale plants offer more competitive rates or should we insist that our polymer producers graduate and grow? It's well known protection to high cost domestic units means no one can be competitive in world markets -- neither the polymer producer, nor the plastics product exporters. The entire world is becoming a wide market place, can we isolate ourselves now? We know that with a per capita consumption below 1 kg. per year we are missing the boat. Similarly, with curtailed operation of processing sector neither can our equipment manufacturers grow nor can they develop skills and strengths to serve a bigger market or export machines and services like Taiwan and Italy. We will all be left behind if any more higher duties are imposed. The Government may continue getting the same contribution to the exchequer with reduced tonnage and nothing more hereafter.

While the other developing nations will worship this 'Sunrise' industry and use it as a vehicle to advance we may miss the dawn and remain in darkness. As we did last year we would with high polymer costs hereafter be compelled to revise consumption targets downwards each year and perspective plans would only be for record files unless once and for all the planners and the revenue collectors have the courage to agree to a stability in polymer costs for the next 5 years at reasonable levels of Rs. 20 to Rs. 24 per kg.

As to whether giant domestic polymer units really need such protection when our Government keeps exhorting industry to become more competitive, I would suggest a quick look at the last 10 years operating results of each of the five producers in India -- the ROI, th tonnage growth and gross margins. Wit world prices having come down eve today processors are awaiting materia quota allotments of HDPE and LDPI from domestic producers -- does thi indicate a glut or a legacy of over protection? Any higher import duties o polymers in Indiaa now, will only mea jeopardising growth of one of the mos rapidly growing industries in the worl and a perpetuation of HIGH INPU COST ECONOMY OF THE LICEN SE RAJ.

Clubbing more practical approach o development commissioners

Another unsettling policy which i upsetting the Plastics Processing Indus try is the recent deregistering of SS units by clubbing of investments ever if one partner or director is common -- irrespective of type of products pro duced, the location of industry or the skills needed.

Plastics machines which were costing Rs. 3 to Rs. 5 lakhs in 1970 cost ove Rs. 12/15 lakhs today, the world has moved towards more sophistication to save resins by precise controls and save energy by revolutionary designs, we have to make efforts to keep up or ou per unit costs make us uncompetitive. For industries where plant and machineries costs are limited, the clubbing of investments do not matter but it is most unrealistic and unfair if one of your partners who is a technical expert or a qualified specialist and shares his skills with 2 or 3 units in different parts of India now is told all units connected to him will be treated as one and all SSI benefits withdrawn.

Rethinking by development bankers

Currently investment in plastic industry is around Rs. 3,500 crores, of this Rs. 875/900 crores is in processing industry i.e. approximately 25%. For the projected investment of Rs. 12,000 crores by 1992/93 almost Rs. 3,000 crores will have to be in processing sector and by 2000 AD if total invest-

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ment is planned at Rs. 26,000 crores the processing sector would be required to invest Rs. 6,000 crores. Without this the polymers produced could not be processed at the rates planned and unless processing sector is ready when new petrochem plants start production what do we hope to do?

The Development Bankers, S.F.Cs., Financial Institutions, etc. have not realised the consequences of the "Selective Finance Policy" being adopted for plastic processing industry for last two years. Unless they review these policies the SSI sector will never be able to set up new plants and machines for processing."

FOURTH INTERNATIONAL SYMPOSIUM ON FRONTIERS OF ELECTROCHEMISTRY

To coincide with the silver jubilee year of the Society for Advancement of Electrochemical Science and Technology (SAEST), Karaikudi and centenary birthday of Pandit Jawaharlal Nehru, who laid the foundation stone of the Central Electrochemical Research Institute (CECRI), Karaikudi, the Society is organising the Fourth International Symposium on Frontiers of Electrochemistry jointly with the Central Electrochemical Research Institute (CECRI), Karaikudi from 14-16, November, 1989 at Madras.

The theme of the Frontiers of Electrochemistry Symposium discusses the entire spectrum of electrochemical science and technology. Broad areas will be covered on Membrane cell technology; High energy density batteries/-fuel cells; Concrete corrosion; Corrosion monitoring; Amorphous and composite materials; Pollution control; Electrocatalysis/Underpotential deposition/ Photoelectrochemistry; Cyclic voltametry & Electroanalytical techniques; Electrobiology; Conducting polymers/ Electropolymerisation; Plating for electronics; Mass transfer in electrochemical reactors; Water electrolysis/Hydrogen production; Electrorefining for superpurity metals.

Those who wish to participate in the above symposium may immediately contact the Secretary, Society for Advancement of Electrochemical Science and Technology (SAEST), Karaikudi-623 006, Tamil Nadu, India for further details.

CECRI TRAINING PROGRAMME

A three day special training programme on testing evaluation of synthetic lead acid battery separators was conducted during 19th to 21st July, 1989 at Central Electrochemical Research Institute, Madras Unit, CSIR Madras Compex, Madras-600 113.

The participants were given full exposure in testing and evaluation of the synthetic lead acid battery separators for their various properties. The entire programme was practical oriented covering the topics such as synthetic lead acid battery separators and their evaluation -- an overview; physical examination and structure; pore properties; acid interaction; mechanical, chemical, electrical and electrochemical properties. Besides, overview on the present status of lead accid separators in India, modern developments and future trends were presented by scientists, Sri K. Dakshinamurthi and Shri S. Palanichamy.

Shri K. Dakshinamurthi, Head, Battery Testing Centre, Madras Unit welcomed the participants. Shri M.V. Ananth, Course Coordinator, explained the scope of the training programme. There were ten participants from all over the country.

On the concluding day of the programme, group discussions were held and later Dr. N.V. Parthasarathy, Scientist-in-charge, CECRI, Madras Unit, distributed the certificates and Shri M.V. Ananth, Course Coordinator, proposed a vote of thanks.

Move to hike duty on plastic inputs decried

Against the backdrop of the indigenous manufacturers being unable to meet even 50 per cent of the domestic demand for raw materials for the plastics industry, the Government's reported move to increase the customs duty would only lead to windingup of operations by many of the existing 20,000 plastic products manufacturing units in the country.

With the existing customs duty on all raw materials for plastics, the industry is somehow surviving on the bottom line because of almost the same price of both the domestic and imported price of raw materials namely, LDPE, HDPE, PVC and polypropylene.

The president of the Indian Plastics Federation, Mr. M.L. Lahoti while addressing newsmen at Calcutta recently said Indian Petrochemicals Corporation Ltd. (IPCL) had increased its prices few years ago when the international price was high. Now, as the international price has decreased IPCL should make commensurate reduction in its prices. If that is not possible, the Government should not effect any increase in the existing customs duty, so as not to starve domestic plastic units of raw materials.

The move to increase customs duty would ultimately result in affording undue protection to domestic raw material manufacturers who have already taken advantage of the international situation by increasing their prices abnormally in a phased manner. The domestic prices of almost all the plastics raw materials which were ruling around Rs. 21 per kg about two to three years ago are approximately 50 per cent higher today, according to the IPF president.

The abnormal increase in prices by the domestic manufacturers is reflected in the fact that the net profit of IPCL in the previous financial year had come up to over Rs. 100 crores from Rs. 72.68 crores the year before on a higher turnover of Rs. 1,027 crore against Rs. 882.93 crores. The gros profit in 1988-89 is estimated at Rs. 16 crores against Rs. 139.81 crores in th previous year. It is significant to not that IPCL's contribution to the publi exchequer has gone up by 45 per cen to Rs. 454 crores last year. Similar is th growth in profit -- both gross and ne -- of other indigenous manufacturers namely, PIL, NOCIL and Polychem.

This amply proves, said Mr. Lahoti that the price hike by the raw materia producers is only to raise their profi margin by exploiting the sellers' marke and as such, it is most unfair and unjus tified. In fact, instead of proposin increase in customs duty, the Govern ment should either pressurise the pro ducers to reduce their prices to reasonable level or to allow free com petition with imported materials.

Both IPCL and PIL are enjoying th benefits of monopoly for some of the products, as there are no other produc ers of LDPE, HDPE and polypropylen in the country at present.

Refinery projects: Panel makes out case for 25% cut in capital cost

A case for a 25 per cent reduction in capital cost of refinery projects in India has been made out by the panel on refining for the Eighth Plan set up by the Planning Commission. The panel has pointed out that at present the economics of refining is not sufficiently attractive in India in spite of high capacity utilisation and low wages.

One of the reasons for the present high cost is that it takes about five to seven years for a refinery to come up after a decision is taken. The high cost per tonne of crude capacity in India compared to the design by multinationals has also been attributed to the higher cushion kept in the design to take care of Indian conditions.

Functional and non-functional overdesign in cost plus design is considerable when compared with the norms established by multinational corporations in their pursuit of achieving high levels of capital productivity.

The panel, which made an economic analysis of import of crude oil versus products, has said that though there is adequate justification to install new capacity on strategic considerations alone, improvement of capital productivity by reducing excessive design margins and speeding up project implementation is feasible and should be achieved.

According to the panel, a reductrion in capital cost by 15 per cent to 25 per cent is likely to make refinery projects in India reasonably acceptable from economic considerations even at the current low gap between crude and product prices.

To reduce cost, the panel has also suggested that a common approach be adopted for grassroot refining projects by standardising the professing scheme with either hydrocracker unit (HCU) or fluid catalytic cracking unit (FCCU) as secondary processing since it will require minimal fresh engineering needs to suit individual project requirement.

Refining projects should be treated procedurally in the same manner as Oil India, ONGC and Gail projects in regard to foreign exchange and DGTD clearances. Continuity of key personnel for executing subsequent projects should be ensured to have speedier decision-making and to get the benefits of lessons learnt from previous projects.

A core group should be set up under the convenorship of the oil coordination committee with specialists drawn from engineering consultants and refining companies. The group will provide the basic input data for the Eighth Plan document and the refinery projects.

The economics of refining of crude oil versus import of products was studied by the panel for an economic size refinery of six million tonnes with two alternatives of secondary processing facilities -- HCU and FCCU -- on the basis of the data collected for the period 1983 to 1988. This included sales realisation based on average crude and product prices (CIF) and operating cost based actual experience of existing refineries as well as on norms being used in preparaton of feasibility reports of grassroots refineries.

The study showed that the net margins, including capital recovery at 12 per cent discount rate were negative in most of the years studied, exceptions being 1983 and 1988. The returns for a grassroot refinery were less than 12 per cent except at 1983 and 1988 prices.

For an inland refinery, say about a 100 kms away from the port, the rate of return would improve by 2.8 per cent to 4.1 per cent for a FCCU and 2.5 to 3.8 per cent for HCU. The sensitivity analysis indicated that the net margins, including capital recovery at 12 per cent discount rate, would improve substantially and would become positive in all the years if kerosene and high speed diesel prices were increased by 15 per cent. Similarly, the economic rate of return would be more than 12 per cent in almost all the years if kerosene and diesel prices were up by 15 per cent.

Ministerial row over Auriya complex

A tussle is on between the Ministry of Petroleum and Natural Gas and the Dept. of Chemicals and Petrochemicals over the selection of an agency for implementing the gas cracker complex at Auraiya in Uttar Pradesh, it is learnt.

While the Petroleum Ministry is intent on Gas Authority of India Ltd. (GAIL) being awarded the prestigious Rs. 2,000-crore petrochemical project, the petrochemicals department is of the view that the contract should go to Indian Petrochemicals Corpn. Ltd. (IPCL).

Incidentally, GAIL is under the administrative control of the Petroleum Ministry and the proposed gas cracker is to be based on supplies through the Hazira-Bijaipur-Jagdishpur (HBJ) pipeline which is being implemented by it. IPCL, on the other hand, is under the charge of the Department of Chemicals and Petrochemicals in the Ministry of Industry.

The differences of opinion have been so sharp that the Projects Approval Board (PAB) comprising the Secretaries of the Economic Ministries has failed to arrive at a consensus in selecting the awardee even after three special sittings.

Following the first meeting and hearing that a decision may be taken on the project at the next sitting, the Petroleum Secretary (when he was abroad) is believed to have informed others not to discuss the issue in his absence.

The Petroleum Ministry wants to ensure the project for GAIL as it will have no project in hand after the completion of the HBJ gas pipeline. It feels that since the authority is in charge of piped supplies of natural gas through the pipeline, it is only proper that it is allowed to branch out to the production of intermediates as a diversification plan.

This view is refuted by the petrochemicals department and on the grounds that GAIL does not have any experience in setting up such a gas cracker complex. IPCL has been the premier unit operating in the petrochemical field. It is presently engaged in setting up the country's first gas-based petrochemical complex at Nagothane in Maharashtra. The complex is in the last lap of completion and well within the time schedule.

Besides, IPCL can boast of considerable expertise and manpower in the field and thus is well-equipped to handle a project of the size of Auraiya.

The most important reason, the department feels, is the fact that IPCL will have no difficulty in mopping up the required funds for the project on its own. Moreover, no time should be lost in awarding the contract to it for its timely implementation during the Eighth Plan.

PAB, however, failed to resolve the issue and a compromise formula was suggested at one of the meetings. Under the formula, GAIL is to be given the charge of setting up the gas cracker and downstream units are to be given to IPCL for implementation.

Sources feel that this is not likely to lead to a workable solution and draw a parellel to the decisions on the Hazira cracker complex when it was initially decided to award the gas cracker to Reliance Industries and reserve the downstream units for other contenders.

The decision, however, was subsequently reversed as it was felt that the downstream units would have to depend on the whims and fancies of Reliance for the supply of ethylene. Instead of sowing the seeds of a perpetual tussle and bickering, the gas cracker as well as the downstream units were awarded to Reliance.

PAB will meet shortly to discuss the compromise formula but if precedent is anything to go by, a consensus is not likely soon.

Gar cracker in Gujarat

Meanwhile IPCL has submitted a proposal to the Government for setting up a new gas cracker in Gujarat utilising Gandhar gas. It is to come up in an environmentally congenial location in Gujarat so that it can support the corporation's Baroda complex.

IPCL is also understood to have contracted imports of LDPE and LLDPE at $665 and $680 a tonne, respectively during the week. By mid-September when this material is expected to arrive, IPCL is likely to reduce its pooled price providing much-needed relief to processors who suffered because of rising international prices during the last two years. Availability is also expected to improve in the coming months.

TATAS NOT BACKING OUT OF KARNAL REFINERY PROJECT

Mr. D.S. Seth, Chairman, Tata Chemicals Ltd., has in a press release denied that the Tatas had at any stage contemplated withdrawing from the Karnal Refinery Project to which they had remained fully committed ever since the memorandum of understanding was signed two years back.

On the contrary, Tatas deeply concerned about the delays, had taken several initiatives, not always successfully, to expedite the implementation of the project, according to the press release. As per the MoU, IOC will have to bear only 5% of the project cost and not 100%, if they had to undertake the project all on their own. Mr. Seth also explained that the levy of import duties on supplies from the Soviet Union had nothing whatsoever to do with the pattern of ownership of the project which is in the joint sector.

Instead, Mr. Seth praised the way the Soviets had offered their fullest cooperation for the implementation of the Karnal Refinery and added that both IOC aand TCL were keenly looking forward to the Government decision on the question of import duties on Soviet supplies which, they ardently hoped, would be a favourable one.

KUTCH-SAURASHTRA OFFSHORE

OIL gets licence for exploration

Oil India Ltd. (OIL) has been granted a petroleum exploration licence by the Petroleum Ministry to explore for oil in the Kutch-Saurashtra offshore basin over an area of 24,900 sq. km. An OIL press release said at New Delhi recently that the company had originally applied for an area of 35,000 sq. km. in the Kutch-Saurashtra offshore basin in August, 1988. It had also paid the licence fee of Rs. 3 lakhs for the first year.

OIL's application for an onshore area of 85,000 sq. km, in the Ganga valley is still under the Government's consideration. The company has started initial planning to carry out exploration programmes in both these basins.

In the Eighth Plan, a provision of Rs. 78 crores has been made by the company for Kutch-Saurashtra and Rs. 105 crores for the Ganga valley. Apart from additional seismic surveys in the regions, OIL plans to drill three exploratory wells with a total metreage of 15,000 in the Kutch-Saurashtra offshore basin and five wells of 25,000 metres in the Ganga valley basin.

An OIL team is currently assessing the feasibility of setting up the Kutch-Saurashtra project headquarters at Jamnagar or Rajkot in Gujarat. The port facilities of Kandla are expected to be used for shipments and the handling of equipment and materials.

In the areas adjacent to the region in Kutch-Saurashtra where OIL has been granted a licence, about 10 offshore exploratory wells have been drilled from 1976 onwards. It is estimated that the hydrocarbon resources in the region could be of the order of 500 million tonnes.

In the 1970s, the Government leased out an offshore area to an American company, Reading and Bates which drilled two wells in the Kutch basin in 1976 and 1977. In their first well drilled to a depth of 4,573 metres, they found oil and gas indications. The second well drilled up to 4,510 metres, encountered minor gas shows.

In the 1980s, another American company, Chevron, and the Oil and Natural Gas Commission have also undertaken drilling in the basin. On getting the formal grant of licence, OIL will acquire all the existing geophysical and drilling data from ONGC as also the data collected by the foreign companies, and carry out fresh and independent data interpretation.

Around 10,000 line kilometres of addition seismic surveys are expected to be done to identify the exact locations for drilling. Drilling and surveys will be conducted by OIL through charter hire contracts by Indian joint ventures or foreign oil companies.

CHEMICAL POLLUTION DAMAGING OCEANS

Daily chemical and biological pollution is damaging the oceans at an alarming rate, while ongoing coastal development and overfishing hamper their ability to recuperate, warns a report. Nutrient discharges from sewage, fertilisers and acid rain have led to a global epidemic of algal blooms which choke off oxygen from the waters they infest and are sometimes toxic, the report published in the latest issue of the magazine World Watch says.

Persistent oil and chemical pollution are also taking their toll, with habitats like coral reefs, mangrove forests and wetlands fast disappearing throughout the world. The future of the oceans is threatened by increased ultraviolet radiation due to ozone depletion and by rising sea levels caused by global warming.

ONGC for talks with suppliers

The Oil and Natural Gas Commission (ONGC) has decided to have open brainstorming sessions with its various Indian suppliers in a bid to open up channels of communication and sort out mutual problems that may exist on either side.

The first such session which was recently held at Madras has been termed as successful by ONGC top brass. Apart from throwing up several other important issues of mutual interest for discussion, the session helped ONGC and the indigenous companies to sort out the vexed issue of supply of barytes.

The participants at the Madras session comprised representatives of major suppliers and contractors to ONGC engaged in manufacturing chemicals, cement, mud tank pumps, high pressure valve and rendering drilling services on charter hire. ONGC is planning to hold such meetings frequently at the regional level as well as the corporate level. The second meeting is likely to take place at Bombay on August 3.

Barytes is an important drilling fluid additive, and is the most convenient and universal weighing material used for increasing the specific gravity of the drilling fluids to enable safe drilling through high pressure formations. Its uninterrupted availability is critical to the success of drilling of wells.

The southern region has been acting as the nodal agency for the procurement of barytes for the Commission. The total requirement for ONGC is about 2.1 lakh tonnes for 1989-90, which is likely to cross three lakh tonnes during the next Plan period.

On discussion, it was found that the barytes shortage had been compounded due to non-availability of railway rakes and wagons, power shortage and inadequate grinding and testing facilities at the suppliers end. The brainstorming session with the representatives offered a workable solution to the problem of shortage of barytes. The steps envisaged at the session to get over the shortage of barytes include the formulation of rate contracts, placement of firm supply orders, installation of grinding units near ONGC's work centres, and facilities for testing.

Presently about half the purchases and service obtained by ONGC are through indigenous manufacturers and suppliers. The cumulative foreign exchange savings, according to ONGC, add to Rs. 4,500 crores. The major initiatives which have been taken by ONGC to optimise indigenous capacity are: projection of its future requirements for various items in terms of quantity and time and simplification of Government procedures regarding availed deemed export benefits, import licences, etc.

In the case of ONGC, the registration procedures particularrly those of chemical manufacturing units have been streamlined to cut down registration time. The power to register firms has been decentralised up to the regional level.

ONGC has also decided to award rate contracts for such companies which have proven expertise and capacity to manufacture the items for providing services already successfully tried by it.

USSR's NO TO ADDITIONAL SUPPLY OF CRUDE OIL

The Soviet Union has turned down India's request for supplying additional quantities of crude oil. The Minister of State for Petroleum and Natural Gas Mr. Brahm Dutt told the Rajya Sabha in a written reply that "our request for additional crude has not been met with a positive response."

The Indo-Soviet trade plan provides for import of 4.5 million tonnes of crude and 2.85 million tonnes of petroleum products from the Soviet Union duri 1989. A contract has been sign between Indian Oil Corporation and t Soviet agency in accordance with t trade plan. However, in view of t Soviet Union's refusal, 17.96 milli tonnes of crude oil will be import from different sources this year to me the demand of crude oil in the countr Mr. Brahm Dutt said.

RAJASTHAN GLYOXAL DECLARED SICK

Rajasthan Glyoxal Ltd., a compan making glyoxal, is declared sick unde section 15 of the Sick Industrial Com panies (special provision) Act, 1985, is learnt. Glyoxal, an organic chemica is widely used in the drug industry an has been in short supply for a couple o years as there were only two manufac turers.

According to informed sources, th company has been in a serious finan cial crisis for some time with a shar fall in the market price of glyoxal fol lowing the entry of two new units int the manufacture of this chemical. Th price of glyoxal has thus dropped t Rs. 23 per kg now. The chemical wa selling at a price of Rs. 43 per kg only some months ago. The company has no paid any dividend for the last two years and there has been no trading of its equity shares in the Bombay Stock Exchange since April 1986.

FIFTH CARBOHYDRATE CONFERENCE

The Fifth Carbohydrate Conference, jointly sponsored by the Indian Association of Carbohydrate Chemists and Technologists and the University of Jodhpur, will be held on 10th and 11th November, 1989 at the University of Jodhpur, Jodhpur. Those who are interested to attend the conference can write to: Dr. N.K. Mathur, Convenor, Vth Carbohydrate Conference, Department of Chemistry, University of Jodhpur, Jodhpur-342 001.

ONGC move to fix utilisation norms

The Oil and Natural Gas Commission (ONGC) has started an exercise to fix utilisation norms for the facilities and equipment available with it to cut down operational costs and enhance efficiency.

According to official sources, the exercise includes analysis of critical areas through management and technical audits to ensure improvement in productivity, cost control and reduction and to improve the overall efficiency of different operations in various sectors of activities.

Performance in various segments such as logistics, materials management, engineering, maintenance, drilling, operations, finance, administration, personnel management is to be reviewed periodically and analysed to watch the trend.

The number of studies encompassing the areas of operations being undertaken as a part of the exercise is 165. In addition to the studies, special task forces are also being set up in specific cases for focussing attention on high-priority jobs. The recommendations will be discussed by the top management including the executive committee of members headed by the Chairman.

ONGC claims to have brought about a saving of over Rs. 167 crores as a result of deliberate cost-reduction measures in 1988-89. These measures acquire significance because the revenue generated is linked to the fixed administrative price which has remained unchanged since July, 1981 and the only way of increasing margins per unit available to ONGC is through improving productivity and efficiency in operations.

According to ONGC, during 1988-89, it has achieved a saving of Rs. 31.84 crores through optimal utilisation of fixed asssets like rigs, drill, ships, logging units, cementing units, lift and earth-moving equipment, seismic units etc.

Significant savings have also be achieved through increasing the utili tion of helicopters per day, commissi ing of pipelines for transportation crude, improvement in the consumpti of pour point depressant (PPD), con sion inhibitor at various offshore inst lations, and optimising the use of m chemicals during drilling.

Innovative efforts during the ye 1988-89 in various areas of operatio have helped bring about a saving Rs. 3.68 crores. A new concept h been put to use for modification of r foundation effecting 90 per cent redu tion in time required for site preparatio resulting in a saving of Rs. 0.40 cro annually.

The Gandhar EPS, has been inno atively extended to handle oil up t 1,000 tonnes per day. This has result in a saving of about Rs. 0.53 crore p annum. Saving in foreign exchange t the extent of Rs. 1.25 crores have als been effected by substituting the ge erator and electrical equipment for dri ling and workover rigs.

The innovative use of OSVs ha helped save Rs. 0.44 crore. In-hous design and development by ONGC ha further helped in curbing the drain o foreign exchange. During 1988-89, saving of Rs. 77.37 crores has bee achieved this way. Major savings hav been effected as a result of inhouse laying of crude and gas pipelines.

About 156 km of Nawagam-Koyal pipeline in Gujarat were laid down departmentally saving Rs. 18 crores.

The ONGC's central workshop has been doing pioneering work in the development and manufacturing of high capital items like horizontal separations cement bunkers, fume extractors, which has resulted in substantial savings.

Logging of the wells done depart-mentally in wells around Kalol (Gujarat) has saved about Rs. 18 crores. Savings to the extent of Rs. 7 crores have also been effected as a result of employing departmental logging units, VSP operations, and optimising services.

NDAL plans Rs. 500-crore investments

Indian Aluminium Company Ltd. NDAL) has firmed up investments to e tune of Rs. 500 crores for the next ur to five years.

The Managing Director of INDAL, Mr. V.S. Sachdev, told newsmen after he company's 51st annual general neeting at Calcutta on July 31, that the nvestments would be on setting up cap- ive power plants, modernisation of the abrication units and the bauxite mines nd explore the electronic sector.

While Rs. 144 crores had been allo- cated to the Hirakud Power Company Ltd. a new company formed to set up a 67.5 mw thermal plant for INDAL's smelters and Hirakud, Rs. 40 crores would be used to modernise the fabri- cation unit at Belpur, West Bengal. However, clearances from the Central Electricity Authority (CEA) and MRTP for the power plant are still awaited.

Other projects under consideration are the modernisation of the foil plant at Kalwa, Maharashtra, the alumina plant at Muri, Bihar, the bauxite mines at Lohardaga, Bihar and the smelters in south India.

Discussions were also going on for expanding the downstream semi-fabrication activities. Mr. Sachdev said that while the capacity utilisation of metal production was only 39 per cent, that of the semi-fabrication units was 125 per cent, indicating the business potential in this area.

INDAL, which entered the electronic sector by setting up a printed circuit board (PCB) plant at Nanjagud, Karnataka, is now looking at other avenues in this area.

As for Belgaum, where the company proposes to put up a 140 mw combined cycle captive power plant, arrangements are being made for finances from the International Finance Corporation (IFC) and other world bodies involved in export promotion, Mr. Sachdev said. This is expected to be commissioned in the next two years, provided all Government clearances are received on time.

Earlier addressing the shareholders, Field Marshal Sam Manekshaw, Chairman, said that the 15 month period between January 1988 to March 1989 had been the best in the company's history with production, sales and profitability marking an upward rise.

The recent liberalisation announced by the Government including the withdrawal of the pricing and distribution controls on aluminium was a welcome move which would promote healthy competition. This had also had a beneficial impact on the operations of INDAL, Mr. Manekshaw said.

The company's sales revenue at Rs. 446 crores marked, a rise of 30 per cent, on an annualised basis, over the 12 months of 1987. Profits before interest, depreciation and tax amounted to Rs. 62 crores as against Rs. 24.5 crores in 1987. Net income was Rs. 27 crores (Rs. 22 crores on an annualised basis) compared to Rs. 4.6 crores in 1987, the highest achieved so far by the company.

The board announced a dividend of 25 per cent including a five per cent to commemorate the golden jubilee of INDAL. A total of Rs. 13 crores was proposed to be transferred to the debenture redemption reserve and Rs. 2.83 crores to the general reserve.

INDAL's exports of dry hydrates and semi-fabricated items amounted to Rs. 39.9 crores. With Rs. 19.2 crores being the foreign exchange outgo, the net foreign exchange earned by the company stood at Rs. 20 crores.

Meanwhile the Chlor alkali project had been dropped. According to the director's report, the project was financially less attractive than originally envisaged, and with the company's mainline business improving, it was felt that the funds raised for this project would be more profitably deployed to meet the cost of modernisation of the Belur plant.

W.I. INDUSTRIES SECURES FOREIGN GASOHOL PROJECT

Western India Industries (WILL) has undertaken a Rs. 26-crore gasohol project in Liberia, West Africa, on a turnkey basis. Gasohol is a mixture of gasoline and alcohol and is used to substitute for gasoline and the product necessitates huge cultivation of sugarcane. Low cost of production, low pollution and better burning efficiency are claimed to be the advantages of gasohol over gasoline.

The company has tied up with Engineers India for the detailed engineering of the project. The project has a payback period of seven years. In the second phase, WILL will negotiate with the Liberian government for managing the project.

According to Mr. Nandan Gadgil, company president, the project will be part-financed by Liberian sources to the extent of 50 per cent. The balance will be met through financial institutions and foreign countries. Since the income is tax-free, there would be higher reserves and profitability leading to increased capitalisation.

Physical work will commence in September and the whole project will be completed within three years. The company hopes to have its presence in Liberia for the next 20 years and to help boost its economy on new frontiers.

The company has achieved a turnover of Rs. 20 crores for the 15-month period ended March, 1989 and paid a 37.5 per cent dividend. It has orders worth Rs. 52 crores on hand at present.

Rs. 1,500-CR. ELECTROLYTIC COPPER PLANT PLANNED

HCL asks Japanese company to do feasibility study

The Hindustan Copper Limited (HCL), has commissioned a feasibility study to set up a Rs. 1,500-crore plant to produce one lakh tonnes per annum of electrolytic copper. Mishimetal Corporation, a subsidiary of the Japanese industrial conglomerate, Mitsubishi Corporation has been assigned the Rs. 26 crores contract for conducting the feasibility study as well as to commission a smaller scale plant to produce "cement copper" from minor low-sulphur copper ore at the proposed project site in Malanjkhand, Madhya Pradesh.

The production of cement copper using certain bacterial treatment of the copper ore is the first stage of the proposed project and the second stage of producing copper from oxidised ore would begin after two years, around the time the feasibility study is expected to be completed. Mishimetal has undertaken to study soil samples and assess the extent of the copper bearing ridges in the proposed project area using satellite imagery and other remote sensing techniques. The low-sulphur ore treatment technique is being developed at the Regional Research Laboratory at Bhubhaneshwar where a pilot level plant had already been commenced to produce copper from such low grade ores.

Disclosing details of the Malanjkhand project, in an informal chat with newsmen, the chairman and managing director of HCL Mr. P.V. Venkatesan said that the actual project work of erecting the beneficiation, smelting and refining plants would be started before the end of the Eighth Plan period. The company expected no difficulty in securing the necessary finances either from the Indian capital market or from capital markets abroad. The technology for the proposed plant is likely to come from Chile, the world leaders in processing copper ores. The Mineral Exploration Corporation Limited (MECON), a public sector company is associated with the feasibility study for the proposed project.

Work on the 60,000 tonnes per annum continuous casting (CC) copper rods project at Taloja, near Bombay was fast nearing completion. The plant is expected to go on stream around October this year. The entire demand for such rods in the country could be met from the plant. The CC rods find application in the wiredrawing industry meant especially for the telecommunication applications. The plant is being set up with an investment of Rs. 20 crores. The plant is expected to use imported copper cathodes to produce CC rods with technology from Southwire of U.S.

HCL hoped to replace the imported cathodes with indigenous ones gradually. There is also the possibility of receiving back cathodes instead of copper wire rods from the foreign converters who process the excess copper concentrates that are being exported from this country.

The modernisation programme of Bihar and Rajasthan based mining operations of the company is nearing completion. This would raise the blister copper production of the company from 38,000 tonnes to 45,000 tonnes. The company is also planning to produce specialised copper and copper alloys. The production of oxygen free high conductivity copper and beryllium copper alloy had already been taken up in collaboration with Defence Metallurgical Research Laboratory, Hyderabad.

Mr. Venkatesan disclosed that the southern regional demand for copper has been growing steadily in the recent times and is expected to touch a figure of 25,000 tonnes per annum for CC rods alone. To cater to the increasing demand, the HCL has set up an office in Bangalore, the second such office to come in the southern region.

Mr. Venkatesan said the con was able to turn the corner in its cial performance during the las years. The accumulated losses was about Rs. 130 crores, about a ago, has now been reduced to R crores.

NARORA PLANT SYNCHRONISED

The first unit of the Narora At power station has been synchron with the northern power grid, it officially announced at New Delh July 31. The first unit of the st which achieved criticality on Marc last was synchronised at 0641 hour July 29, the announcement said.

Located on the banks of the Ga downstream of Narora barrage in U Pradesh, the Narora station consist two pressurised heavy water reactor 235 MW capacity each using nat uranium as fuel and heavy water moderator and coolant. The station c about Rs. 532 crores.

The Narora design incorporates st of the art design features to achieve s and reliable operation, according to Department of Atomic Energy. It is s cially designed to withstand the se mic conditions of the site, Department said. After the first critic ity of the reactor, a series of experime at low power were conducted and t results of these experiments were an lysed and submitted to the Atom Energy Regulatory Board and its sp cial committees for detailed review an scrutiny. Thereafter, the Board clear the synchronisation of the unit to t grid system.

The power level of the unit will b raised in stages according to a pro gramme approved by the Board. A full equipped waste management facility ha been commissioned and all waste aris ing from the power station will b treated in this facility. Any discharg from the power station will comply wit internationally laid down limits, th Department said.

Edible salt to be totally iodised by 1992

The government has decided to completely iodise edible salt by 1992 in a phased manner. This was stated at New Delhi on July 28, by Mr. M. Arunachalam, minister of state for industrial development, while inaugurating a special meeting of the Central advisory board for salt.

He said India had made remarkable progress in increasing the production of iodised salt from two lakh tonnes in 1984-85 to 21.9 lakh tonnes in 1988-89. This was one of the biggest health care programmes undertaken by the government involving about 500 million people.

He informed the board that government had now covered the entire sub-Himalayan region of high goitre endemic areas, consisting of Jammu and Kashmir, Himachal Pradesh, Punjab, Chandigarh, Haryana, Delhi, Uttar Pradesh, Bihar, North-Eastern states, Sikkim, parts of Madhya Pradesh and West Bengal, under supply of iodised salt.

Mr. Arunachalam said that government had accepted the recommendations of the working group on the salt industry and decided to set up model salt farms, extension centres, marketing assistance cells, distribution cells and conduct periodical training programmes.

The schemes are likely to be taken up soon and will primarily involve upgradation of technology of salt manufacture, improvement of the quality, increase in exports and assistance to the small-scale manufacturers and co-operative societies in marketing their produce. The government has already sanctioned a model salt farm in Andhra.

Referring to the various concessions being given to the salt industry, he said that this industry had already been made eligible for obtaining refinance facility of IDBI. The salt industry has been included under priority sector in consultation with the Reserve Bank of India. He hoped that this policy decision would help the salt industry in availing priority sector advances at concessional interest rates from nationalised banks.

Mr. Arunachalam expressed his happiness over the efforts to increase the tempo of export of salt which has borne fruit. He said India could recapture the Japanese market after two decades. During 1988-89, a total quantity of 6.63 lakh tonnes was exported against 4.32 lakh tonnes during the previous year.

He urged the salt manufacturers to ensure steady supply of this essential commodity during the months to come.

He told the board that the zonal scheme for distribution of salt was recently revised in consultation with the railways, the concerned state governments and the salt manufacturers. This involves movement of 31 lakh tonnes of salt for edible purposes by rail and 19.5 lakh tonnes by road. By proper linkages of the production centres, the government is able to move this essential commodity over 2,000 km in an orderly manner.

Broad-banding extended to glass fibre industry

The Union Government has brought the glass fibre industry under the ambit of the broad-banding scheme. Facilities under the shceme will also be available to the companies falling under the purview of the Monopolies and Restrictive Trade Practices Act and the Foreign Exchange Regulation Act (MRTP/FERA), besides the non-MRTP/non-FERA units, since glass fibre of all types is listed in the Appendix-I schedule of industries.

For the purpose of broad-banding, the industry has now been grouped as "glass fibre of all types except rock wool/slag wool". According to a press note issued by the Department of Industrial Development at New Delhi recently, the broad-banding scheme is being extended to the glass fibre industry as the basic requirement of raw material as well as capital equipment (up to the bushing stage) is common in the manufacture of glass fibre, glass wool and staple tissue. The facilities under the scheme would, however, be available only within the existing licensed capacity.

Some of the other standard conditions are that the broad categorisation of items is for the purpose of industrial licensing only. The units will have to continue to report the production statistics in accordance with the existing classification prescribed by the Directorate-General of Technical Development (DGTD).

Besides, broad-banding will not be available to any item, especially if that item is reserved for the small sector. In case the existing industrial undertaking is already manufacturing a reserved item, then the cappacity for that item will be pegged to the level for which the unit is already licensed.

The press note says that the normal procedures notified through the earlier press notes on broad-banding will be followed for availing of the facilities under the scheme. The glass fibre industry is incidentally the 44th group to have been brought under the scheme. It is expected that the scheme would enable the industrial undertakings to have flexibility in their production set-up as also help in diversifying their product range on the basis of common infrastructural and production facilities.

IMPORT APPLICATION FEE: DEPOSIT, REFUND NORMS AMENDED

The Government has amended "Appendix-II C" of the Handbook of Procedures regarding the procedure for deposit/refund of import application fee and other ITC deposits (payment of fees). According to the amendment "unless an applicant is exempt from payment of fees under Clause 4 of the Imports (Control) Order, 1955, every application for an import licence/CCP should be accompanied by two copies of bank receipt duly stamped by the Central Bank of India indicating the deposit in accordance with the prescribed scale of fees indicated in the Schedule-II of the Imports (Control) Order. The deposits should be made alongwith the relevant form/T.R. 6 clearly indicating the head of account."

The official notification says, "In cases where the applicant has misplaced the two copies of bank receipt referred to Clause (I) (A) above, the applicant should file an affidavit on the stamped paper to the effect that the two copies of bank receipt in question have been lost or misplaced and have not been utilised in any other manner."

"Further, he should also mention that if the said two copies of bank receipt (or any one of the two copies of the bank receipt) are found subsequently they shall be returned to the licensing authority concerned and shall not be utilised in any other manner." The particulars of the bank receipt i.e. licensing period, the amount remitted, the date of payment should also be stated in the affidavit."

As for the refund of application fees, the notification says "where the applicant is eligible for refund of applica fee, an application for refund in the scribed form given in this appendix be submitted to the licensing auth within whose jurisdiction the fee paid. While making an applicatio refund, both the copies of bank rec (two copies) should be enclosed the application for such refund."

In cases, where the said copie bank receipt have been enclosed the application for the licence, the t copy of the bank receipt may be f ished. In all the cases, number and of the bank where the fee was de ited should be given. This public no will be effective from August 14 year, says the official release.

IOL EYEING STEEL SECTOR NEW MARKET

Indian Oxygen Ltd., (IOL) a mer of the BOC group, is eyeing the s sector as a possible lucrative marke its captive gas plants. Mr. S.B. Bu raja, Managing Director, IOL, newsmen that the company's new s egy would be to concentrate on sup ing captive gas plants to the unit Steel Authority of India Ltd., (SA Tata Iron and Steel Company (TISCO) and the mini steel pl across the country, apart from servi the merchant markets.

IOL is optimistic of bagging two s orders of 500 tonnes per day (tpd), tpd for the Rourkela and Bhilai s plants respectively. Gas plants for titanium dioxide unit at Orissa and Hindustan Zinc Smelter at Chittor, figures high on its plans. For the TIS modernisation programme, the comp would put up a 500 tpd oxygen p and an argon purification unit, the la entailing an investment of Rs. 4 cro

On its health care division, Mr. B hiraja said that arrangements have b worked out with the world renow Diasonics Sonotron of the UK Viggo of Sweden for marketing t range of health-care equipment incl ing the magnetic resonance imag systems and cannuales.

OTLIGHT ON

Biotechnology & Life Sciences (Part 1)

SEARCH ON TRANSGENIC IMALS OPENS UP NEW HOR-ONS IN AGRICULTURE & ARMACEUTICAL SCIENCES

Transgenic animals arise from the nsfer of genetic materials from one cies to another and consequently ate a genetic make-up that would not e from conventional methods. At sent there are three main areas of earch into transgenic animals.

Agricultural scientists look upon nsgenics as a further development of ective breeding, which aims to prove certain characteristics of lives-k. Pharmaceutical researchers look n transgenic animals to become armaceutical factories' producing ge amounts of human proteins, such Factor VIII, the blood clotting agent. entists could harvest these drugs m the animals' milk.

Transgenic animals also provide ence with important insights with etic physiology and embryology. e opportunities afforded to society by nsgenic technology are therefore con-erable. However, as with any new hnology, there may be risks. In this e the risk may be to those persons rying out the work, to the general olic, to the transgenic animal, to other mals, domestic or wild and to the neral environment. (*New Sc.*, 1/17/89, 25).

AGING OF AMINO ACID & OTEINS BY ATOMIC FORCE CROSCOPE BECOMES ASIBLE

The Atomic Force Microscope FM) was developed in 1986 by earchers at Stanford University. It is more powerful than the Scanning nnelling Microscope (STM) for imaging biological specimens and does not require the material to be electrically conducting. It works like a miniature record player. A shard of diamond. scans the surface of the object and the diamond's movement is relayed to the spring attached to a sensor.

A potentially far more powerful tool for imaging biological molecules is the AFM because it does not require the material to be electrically conducting. Paul Hansma, from the Department of Physics at the University of California at Santa Barbara has been using an AFM to image individual molecules of amino acids and proteins.

The technique looks set to take microscopy far beyond what the STM can achieve. Hansma has already obtained remarkable real time images or molecules as they form polymers. He believes that AFMs will eventually allow scientists to see molecules docking onto cells. (*New Sc.*, 1/28/89, p.31).

PEGNOLOGY -- A NEW PROCESS TO ENHANCE THERAPEUTIC ACTION OF ENZYMES

Pegnology, the new process of attaching polyethylene glycol to enzymes and proteins, can extend their circulation in the blood stream and improve their pharmacological effectiveness. The researchers have found the way to disguise therapeutic substances which the body typically recognises as foreign and seeks to destroy. Pegnology overcomes this problem by allowing these substances to remain in the body and provide enhanced therapeutic effects.

Scientists at Enzom Inc. and Rutgers University developed the process. Enzom is commercialising it and evaluating five enzyme products based on pegnology.

a. PEG -- asparaginase under study is for treatment of acute lymphoblastic leukaemia in children,
b. PEG -- SOD is under study to prevent reperfusion in kidney transplanted patients,
c. PEG -- uricase is under study for preventing uric acid build up,
d. PEG -- catalase is under study as an antioxidant for trauma and severe burns, and
e. PEG -- ADA, for treatment of severe combined immunodeficiency syndrome (Bubble boy's disease).

Pegnology, according to researchers has potential applications for many other therapeutic proteins. For example, heart medications such as thrombolytic enzymes require high doses and frequent use to ensure efficacy. Researchers believe PEG-coated medications would overcome the disadvantages of drugs which like strepptokinase are removed from the blood rapidly or which cause allergic reactions after repeated use. (*CMR*, 4/17/89, p. 32).

BIOTECHNOLOGY FORGES AHEAD INTO AGRICULTURAL FIELDS IN USA

Plant biotechnologists are on the verge of creating a tool kit of techniques for genetically engineering all type of food crops. The new genes will create biological pesticides, increase yields or alter the physiological properties of plants to produce such creations as the long sought blue rose.

Overall the results -- which will reach commercial use within 3 years -- will make a revolutionary impact on agriculture. Genetic engineers succeeded in transforming tobacco plants in the early 1980s by inserting strands of foreign DNA in a plant virus. Since then, similar techniques have allowed researchers

to transform tomatoes, cotton, and many other broad leaved plants.

However, narrow leaved plants, monocots, which include most of the world's important food crops such as rice, wheat and maize have largely eluded efforts to find a reliable means of genetic engineering. These barriers are now falling according to Robert Fraley, Director of Plant Biotechnology at Monsanto, which is leading in the application of biotechnology to agriculture.

Fraley predicts that within two years i.e. by 1991, genetic engineers will be able to modify the genetic codes of all crop plants. Groups around the world are testing several ways of introducing foreign DNA into maize, the USA's most valuable crop.

Recently Catherine Macky of Pfizer's agribiotech research, described a bizarre new technique called microprojectile bombardment. This involves shooting with an explosive charge of microscopic tungsten pellets coated with DNA into target cells. Results have been promising. Macky reports 'The technology for genetic engineering of corn has been a long time coming, but I believe it is at hand. Then the fun begins'.

Rice has also recently yielded to genetic engineers reports Peter Day, a former director of Britain's Plant Breeding Institute in Cambridge, now with Rutgers University in New Jersey.

Wheat, he reports, 'still remains elusive'. The problem is not so much introducing the new DNA which can be injected into culture of cells, but inducing the mass of altered cells to grow into a complete plant. One new biological pesticide avoids the difficulty of directly engineering maize plants by relying on a class of microorganisms called endophytes. These microorganisms live within plants causing an apparent damage to their hosts.

Another company Crop Genetics International has developed a genetically engineered endophyte, Clavibacter Xyli, by inserting a strand of DNA from bacillus thuringiensis, which produces a chemical which is toxic to many crop pests.

Crop Genetics target is the European corn borer, a pest which causes damage costing $500 million a year to maize in North America alone. The researchers inserted modified endophytes into corn seeds under pressure. The microbes remain dormant until the seed germinates, and grow with the maize plant in its sap.

Field tests last year showed that the method of innoculating seeds worked. Larger trials this summer of 1989 will show if it reduces damage by pests -- and the company's hope that it leaves no toxic residues. If everything works, the company plans to have modified seeds available in the market by 1991.

Meanwhile, Monsanto's team announced at the AAAS (American Association for Advancement of Science) that it had genetically engineered cotton plants to produce resistance to certain caterpillar type insects. The gene comes from the old favourite bacillus thuringiensis, first inserted in a bacterium agrobacterium tumefaciens, which in turn infects the host plant. The company has reported that the engineered plants could be on sale by 1992 or 1993. One sign of the potential profit from plant biotechnology, once of purely academic interest, is that between 30 and 40 companies around the world are now working on developing it. (*New Sc*, 1/20/89, p. 34).

WORLD'S FIRST EVER HEADPHONES BASED ON BACTERIAL CELLULOSE ON THE HORIZON IN JAPAN

Researchers at Sony Corporation of Japan have produced the world's first headphones based on bacteria. Like all headphones, each earpiece has a d ragm, which vibrates to produce s In most headphones the diaphra made from supressed paper. Now researchers in collaboration researchers from Ajinomoto Co. ar Research Institute for Polymers Textiles have found a way to use obacter aceti, a short rod-shaped b ium, to manufacture these diaphra The researchers feed the bacteria a solution of sugar saccharides, produce threads of cellulose, each than 40 nanometers in diameter. 2 days the threads mesh into a w mm thick. The web is dried, compre into a sheet 20 micrometers thick shaped into a miniature loudspe diaphragm. The resulting diaphrag 10 times as rigid as paper.

The research engineers mount cellulose diaphragm inside a cup-sh wooden casing, carved from the w of 200-year old Zelkova trees. researchers tested 200 different typ wood, and only wood cut from centre of these trees, which grow in Chubu and Tohoku regions of Ja would do. Sony's engineers toured world to find the softest and most c fortable material for covering the piece. They decided on the skin Greek lambs.

The new MDR - R10 'King' he phones cost £2000 a pair and will available in Japan by June 89. (*New* 3/25/89, p. 31).

ANIMAL CELL CULTURE GUIDELINES MOOTED BY JA ANESE MINISTRY OF HEALT

The Japanese Ministry of Health Welfare is preparing guidelines for production of pharmaceuticals usi animal cell culture techniques. A dr is expected to be ready by the spring 1991, according to Japan Pharmace ical News.

Until now there have been no stan ard against which to judge the safety

rticular production process and the tral Pharmaceutical Affairs Coun- has evaluated each application for nufacturing approval individually.

A research group has been set up to ft the guidelines -- it will refer to US d European guidelines and also to ta on production processes previously proved in Japan. The guidelines will ver cell culture and cell fusion techques and will determine which animal lls may not be used and which vires may present problems. (*Scrip*, 17/89, p. 18).

IL OF JAVANICUS -- WORLD'S IRST COMMERCIAL PRODUCION OF EDIBLE VIA MICROIAL FERMENTATION

J & E Sturge (UK) has developed oil f Javanicus, the world's first edible oil roduced by natural fermentation. Commercial production in bulk of an oil rom a microbial source is an important iotech landmark.

Sturge had invested over £6 million o date in the production by fermentaion and has a commitment to the long erm development of Oil of Javanicus s a source of gamma linolenic acid (GLA).

Oil of Javanicus is a mixture of fatty acid triglycerides, which contains 16% gamma linolenic acid (GLA) by weight. It is produced by fermentation using Mucor Javanicus and glucose produced from wheat starch as the feed stock. The oil is extracted from the resultant biomass on site and subsequently refined to edible standards. The process was developed in conjunction with the University of Hull. (*Process Biochem - Pro Biotech*) (p. ii, 6/1988).

FIELD TESTING OF GENETICALLY ENGINEERED MICROBIAL PESTICIDE ON THE HORIZON IN USA

Crop Genetics International is seeking permission from the EPA in USA and the Department of Agriculture to test use of the InCide biopesticide to protect corn plants against European corn borers at 5 sites in three Mid-Western states -- Illinois, Nabraska and Minnesota -- and at three sites in Maryland. The Midwest tests would be carried out in cooperation with four seed companies with which Crop Genetics signed joint development and marketing agreements in 1988.

Crop Genetics is also seeking approval from EPA and USDA for the first time to conduct field trials on rice, at the Ingleside, Md. research farm. It will use the same genetically engineered microorganism as was used in corn to protect against rice stem borers. The trials will focus on the bacterium's colonisation ability in rice and its environmental safety.

The InCide technology of Crop Genetics International, on which patent protection is being sought is based on enabling a plant to produce its own pesticide. As a carrier, it used an endophytic (plant dwelling) single cell bacterium, clavibacterixylincynodontis (Cxc), which is viable only inside the vascular system of a plant. Cxc is native to Bermuda grass, but is also colonises corn and a number of other plants. Cxc is genetically altered to carry the delta-endotoxin gene from the widely used biopesticides, bacillus thuringiensis kurstak (Bt).

When innoculated into corn, Cxc multiplies inside. The endotoxin in it produces an insecticidal protein toxic only to caterpillars with alkaline stomachs, and is inactivated and rapidly digested in the acidic stomachs of mammals, fish reptiles and birds. The company believes that its InCide technology can be used with advantage in rice and corn and in future also with other crops, such as wheat, soybeans, cotton and sorghum.

The 1988 small scale field tests proved the safety of the technology. The recombinant microorganism did not spread from test sites by any natural phenomena or normal agricultural practice, and did not survive outside its host plant. These 1988 trials were done by injecting Cxc/Bt directly into corn stalks. This year's trials will test the projected commercial treatment method -- innoculating corn seeds with Cxc/Bt before planting. The trials will also test corn yields and whether improved plant nutrition with micronutrients can offset small yield losses caused by Cxc/Bt.

ALTERED GENE TEST IN HUMAN -- A NEW LANDMARK IN MEDICAL RESEARCH

National Institute of Health (USA) has successfully injected genetically engineered cells into a human patient for the first time in a federally approved experiment. NIH director James Wyngaarden reports the technique of 'gene insertion could produce therapeutic results in a wide range of diseases' such as brain and growth disorders, heart diseases and immune system defects. (*CMR*, 5/29/89, p. 7).

FIELD TESTS ON INSECT-RESISTANT TOMATOES & CANOLA UNDER PROGRESS

Monsanto Company has begun new research field trials of tomato plants genetically engineered to resist certain insects as well as tests of canola oil genetically engineered to tolerate 'Roundup' herbicide. The trial for 'Roundup' herbicide tolerance has the potential to significantly reduce the cost of growing canola by allowing weeds such as wild mustard and stinkweed to be more efficiently controlled, Monsanto reports. Similar research field trials were successfully conducted last year in both Saskatchewan and Alberta in Canada. The field trial is being conducted at Scott Experimental Farm in West Central Sakskatchewan. Engineered and control (non-engineered) canola seeds were planted and the crops will be stu

died for comparison and for weed control. Canola, a type of spring rape seed oil developed by Canadian researchers, is used primarily for cooking and salad oil and in margarine and shortenings. Nearly 7 million acres of canola are planted annually in Canada, with the value of the crop estimated at $1.25 billion, according to the Canola Council of Canada.

Monsanto researchers placed a gene from another plant species into canola instructing it to make extra quantities of an essential enzyme it already produces -- EPSP synthease. In non-engineered plants, this essential enzyme is inactivated by 'Roundup' herbicide, which causes the plants to die.

In the genetically engineered canola the extra quantities of the enzyme and its decreased sensitivity allow the plants to grow, normally despite the presence of 'Roundup'. Monsanto planted insect resistant tomato plants earlier in 1989 in Mexico and Florida. (*CMR*, 5/29/89, p. 9).

DRUG-DELIVERY TECHNOLOGY

A patent covering a mucoadhesion drug delivery system is among the Bio-Mimetics (Lexington, MA) assets being purchased by Columbia Laboratories (Miami). The mucoadhesion technique "enables a pharmaceutical to pass through the mucous membrane directly into the bloodstream, avoiding the first pass through the liver", Columbia says. The company has signed an agreement to pick up a one-third interest in the mucoadhesion and other patents, and will have the option to purchase the outstanding assets. Columbia, which is basing many products under development on the mucoadhesion delivery system, is "now in a position to ensure that the technology is developed as rapidly as possible" says president and CEO Norman M. Meier. Bio-Mimetics will receive $2.5 million and a 1% royalty on sales.

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(Item-wise in tonnes per annum) :

Production in Last Financial Year
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(with details of country exported to, quantity, value etc.) :

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Acting as stockists for :

Executives :

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Food & Pharmaceutical Technology in Perspective

STLE PIONEERS PALM - FAT SED MILK

Nestle Malaysia Sdn., Bhd., has ma- factured the first milk powder which ntains palm-fat instead of butter fat their full cream brands in Malaysia. e product is called Carnation Instant led Milk Powder which is packed in 0 gm. boxes and 1 kg. tins.

The milk powder is made from non- milk solids and refined palm oil. It ntains milk protein, palm fat and milk gar equivalent to the amount of pro- n, in fresh dairy milk. It also contains cium, Vit. A and D.

The milk powder is manufactured by stle at its milk spray drying plant in langor Darul Ehaan and is said to be first of its kind based on palm-fat. *alm Oil Development*, July 1988, p.).

NEW SOURCE OF VIT. E -- ALM FATTY ACID DISTILLATE

A new source of Vit. E has been dis- vered. This new source is palm oil. esearchers at the Palm Oil Research stitute of Malaysia (PORIM) in andar Buni Bangi, Malaysia have veloped a process to produce Vit. E mmercially from palm oil fatty acid stillate. Last year PORIM launched a lot plant for Vit. E production from lm oil fatty acid distillate. The launch- g of the pilot plant reflected a major complishment in PORIM's research nd development efforts to diversify the ses of palm oil.

This pilot plant is the only one of its ind in the world and was designed sing an innovative technology. This lant will spawn further research on Vit. . (*Palm Oil Development*, July 1988, . 27).

USDA RESEARCH ON SPECIAL COATINGS TO PRESERVE SLICED FRUITS & VEGETABLES

Sliced fruits and vegetables that stay fresh for atleast a week -- that is the goal of a research programme at the US Department of Agriculture (USDA). The researchers are developing edible, transparent coatings to prevent dehydration, browning and microbial attack.

Initial success was obtained with a film that is a combination of milk casein and acetylated monoglycerides derived from vegetable oils. A coated apple slice reported by looked fresh after a week, whereas an untreated slice turned brown and dried up. The casein improves the monoglycerides adherence and forestalls a waxy look. The film has virtually no taste and tests show that it reduces moisture loss by 70%. (*Chem Eng*, 5/1989, p. 21).

FRUCTOSE FACES A GOOD FUTURE IN FOOD TECHNOLOGY

Pure crystalline fructose has been available as an industrial food ingredient in the USA since 1975. In 1981, the world's largest facility for making pure crystalline fructose came on stream in Thomson, Illinois, USA. This American Xyrofin plant has reduced the production time to about 5 days and employs process based on enzymatic isomerisation.

The property of fructose that distinguishes it from all other edible carbohydrates is its high degree of sweetness. Without this attribute, the other distructive characteristics of fructose (i.e. metabolic superiority, less harmful glycemic index, rapid solubility) would rarely serve as an inspiration to food technologists or pharmaceutical chemists to cause them to formulate new products with this remarkable sweetener. Today, this unique sweetener is now given prior consideration by food technologists, whenever a sweetener is required for a particular food.

Currently, most pure crystalline fructose sold in USA is produced domestically. Other fructose producers are located in the EEC countries and the International Fructose Association lists seven members. Current worldwide capacity for pure crystalline fructose probably does not exceed 80 million pounds per year. However, the largest use of fructose is in the USA, where the creative energies of imaginative food technologists have created uses far beyond those found in Europe, where the largest application is for diabetics as a tabletop sweetener. It seems likely that the demand for fructose will continue to increase as the emphasis on nutritionally balanced foods accelerate and the results on ongoing research studies become available.

Nevertheless, it should be thoroughly understood that pure crystalline fructose is not the sweetener for all occasions and all products. Since its introduction, its price has risen from $0.75 to $0.95/lb. This increase is considerably less than experienced, by most food ingredients, for the same period. The manufacture of pure crystalline fructose is capital intensive and requires extraordinary amounts of increasingly expensive energy. Therefore, it is unlikely that its cost will decrease dramatically in the near future.

In USA, which produces pure fructose at the lowest price, the use of fructose in processed food has expanded rapidly in recent years. Some examples of food products that successfully utilise pure crystalline fructose are: a) Dietetic cake mixes, b) Desserts (gela-

tins & puddings), c) Candies -- dietetic and regular, d) Gums -- Athletic types, e) Tabletop sweeteners -- packets, boxes etc., f) Frozen Desserts, g) Diet soft drinks -- with and without saccharin, h) Energy drinks to improve athletic performance, i) Dietary meal replacers, j) Powdered beverage bases.

When a decision is to be made whether or not to formulate a new product with pure crystalline fructose, its inclusion should be evaluated not in the sense of it being an interchangeable commodity type of sweetener but rather as a unique ingredient, whose presence will make the finished product more valuable healthwise, tastewise etc. (*Alternative Sweeteners By Lyn O'Brien Nabora, Robert C*) (*Gelardi. Published by Marcel Dekker, Inc. New York*) (p.p. 245-273).

BUREAU OF INDIAN STANDARDS (BIS) ISSUES DRAFT STANDARD FOR FLEXIBLE PACKAGING MATERIALS FOR PACKING OF EDIBLE OILS

At present edible oils are extensively sold in tin plate containers and other rigid containers made of high density polyethylene (HDPE), polyethylene terephthalate (PET), polyvinyl chloride (PVC) etc., all of food grade quality. But for easier handling and economy in the packaging costs, small flexible pouches have been introduced. The materials used for manufacturing these pouches, however need to have certain special attributes, such as barrier properties like low water vapour transmission rate in addition to the physical properties like high inter-layer bond-strength and heat seal requirements for proper behaviour of the film on sealing machines and during transportation.

Another important requirement is concerned with appropriate storage of the contents of these pouches for 90 days under ambient conditions and for 30 days under accelerated conditions. The BIS has specified all these requirements in a draft standard which has been used in wide circulation for eliciting comments from all those interested in ensuring the quality of materials for flexible pouches for edible oils. The draft standards will be finalised after receiving and examining the views from users, manufacturers and technologists. (*Standards India*, 3/1989, p.496).

A PERSPECTIVE OF WORLD PHARMACEUTICAL INDUSTRY

A look at the modern pharmaceutical industry worldwide reveals a high degree of concentration. Altogether, they are about 10,000 major companies involved in pharmaceutical technology around the world. Of these the top hundred account for roughtly 80% of total sales, according to a recent report on the world pharmaceutical sector from WHO. Drug consumption is similarly concentrated, with the 25% of the world's population living in the developed countries responsible for about three quarters of total drug purchases. In terms of the overall markets North America accounts for 30% of all sales, with Western Europe slightly behind at about 25%. Roughly 15% of the total market is in Japan.

At the top of the tree in the pharmaceutical world are a group of 10 or so large companies with marketing and production operations in all the main countries and annual sales in the $1-2 billion range. These companies comprise the formidable multinational giants and includes Merck (USA), American Home Products, Eli Lilly, Abbott and Pfizer of USA, Hoechst and Bayer of West Germany, Britain's Glaxo and Switzerland's Ciba Geigy and Sandoz.

A present, Japan is not a major world player in drugs. However, Japan has developed in recent years some big pharmaceutical companies, the largest of which is Takeda. They operate mainly in Japan which is the world's second biggest pharmaceutical market after USA. Japanese R & D in pharmaceutical technology has made nomenal progress in the last decad so and has begun its contribution ir development of new drugs. Japa drug companies are becoming slo more internationally oriented. Qu few Japanese companies have b collaboration or joint ventures American and West European cor nies. They often prefer to license ducts to non-Japanese companies t overseas rather than to market its ducts itself abroad.

SAFE BACTERIA DEVELOPI FOR FOOD OF THE FUTURI

The FDA in USA is drawin safety guidelines on the use of nisms in food which have had DNA altered to produce useful 'nat proteins. Susan Harlander, a memb the FDA committee recently repor the International Conference in Germany that her research work c lead to safe bacteria, which when a to food, will produce natural ba cides as alternatives to food pres tives, and enzymes which can re cholesterol.

Harlander is working with a ba ium called Lactococcus lactis. This duces lactic acid and its used to fer dairy, meat and vegetable produc lactis is particularly useful for technologists because the genes i for the fermentation process are lo on a type of DNA known as 'pla DNA'. This is easier to manipulat so improves the way the microorg works.

When technologists add DNA t type of bacteria it joins onto these mids. This DNA can then be ma move onto the chain of the bact chromosomal DNA. This chromos DNA holds the six or seven gene are the genetic fingerprints of the teria. Chromosomal DNA canno between different species of mic ganisms, so once the informati attached to the chromosomal DN

ed in a very stable state. This makes process safe because the information no longer use the plasmid DNA to mp' between different species of croorganisms. If it could, then a smid from a host bacteria might jump o microorganisms in the human gut, d change the way they work.

Technologists who want to add DNA cells use small sections of DNA hich include a new gene which will ake its host produce useful protein. hese are known as cloning vectors. he technologists add 'marker' genes to ese cloning vectors, so that they hold oth the required new gene, and the arker. These markers, are usually enes that make their host microorganism resistant to a particular antibiotic. The technologists can then grow microorganisms on a culture which includes his antibiotic, and only those organisms which contain the cloning vector, and hence the new gene will thrive.

The FDA, however, does not allow the use of markers in food which might make microorganisms resistant to antibiotics. Harlander has got round thus by constructing a marker gene that produces an enzyme which makes the bacteria resistant to a natural antibiotic called nisin, which the bacteria itself produces. This antibiotic is commonly found in fermented food, so the FDA considers it safe enough to use. 'This is the first food-grade marker that can be used for cloning' said Harlander.

Harlander employs a method called electroporation to add her new genetic material to L. lactis. This uses a very high electric field to cut a hole in the surface of the bacteria's cell. If the cell is then held in a medium which contains the new DNA, the new material will sip into this hole. Harlander points out 'This is the tremendous advantage of latest gene technology. You know exactly what genetic information you have integrated into a host organism'. This is not the case with classical gene technique, which relies on creating trial-and-error mutations by exposing bacteria to radiation. (*New Sc.*, 3/4/89, p. 35).

TRANSGENIC PLANTS HARNESSED FOR PRODUCTION OF PHARMACEUTICAL PEPTIDES

Plant Genetics Systems (PGS) of Ghent Belgium, has developed a method for transferring human genes into plants, which has the potential to be used for the production of pharmaceuticals. The peptides made by the plants are stored in specific organs, such as seeds, and can be extracted by a simple process.

The technology was developed by PGS in collaboration with Dr. J. Vanderkerckhove at the University of Ghent. It involves replacing part of the gene for a plant's storage protein with the gene for the required peptide. Small peptides, human enkephalins, have already been produced in plants (Arabidopsis thaliena, phale cress) using the new technique, and peptides with upto 50 amino acids could probably be produced according to Dr. Vandekerckhove.

The enkephalms were pharmacologically active, and although it is not known yet whether larger, more complex peptides are produced in their native active form, the extraction processes used for the plant produced peptides are less disruptive than those used in other forms of manufacture. Greenhouse experiments have confirmed that peptides can be produced in very large quantities in the seeds of rape seed oil. PGS plans to engineer the transgenic plants and extract the product, and then sell it to a pharmaceutical company for further processing. The first agreement with an unnamed pharmaceutical company has already been established.

PGS was founded in 1983 and has genetically engineered insect, virus and herbicide - resistant plants. It has also engineered blue-green algae to produce proteins that kill mosquito larvae. (*Scrip*, March 3rd 1989, p. 27).

NEW CONTRAST MEDIA FROM RESEARCH AT MALLINCHRODT & MOLECULAR BIOSYSTEMS INC.

Mallinchrodt (St. Louis, Mo, USA) has gained FDA's approval for Optiray (loversol) a non-ionic contrast medium for radiology and cardiology X-ray procedures.

The company notes that the product is the only one developed in USA that has been approved by FDA in recent years. The market for X-ray contrast media is currently $500 million in USA alone and may hit $1 billion in 1993. The world market is twice that size.

In addition, Molecular Biosystems Inc. (San Diego, CA) has agreed to give Mallinchrodt exclusive North and South American marketing and distribution right for Albunex, an ultrasound imaging and contrast agent. Mallinchrodt's sale of contrast media is expected to grow at a compound rate of nearly 20% during the next few years. (*Chem Wk*, 1/18/89).

HOPE FOR CFCs AFTER ALL

Tosoh (Tokyo) had developed a new zeolite catalyst for breaking down chlorofluorocarbon (CFC) solvents used in semiconductor manufacture. The new product particularly targets CFC-113, which is due for a production phase-down under the terms of the Montreal Protocol on CFCs.

The catalyst, developed in a joint project between Tosoh and Japan's Ministry of International Trade and Industry (MITI), breaks the CFC down into hydrochloric and hydrofluoric acids -- which can be neutralised -- and carbon dioxide. Tosoh plans further development work on the catalyst and optimisation of the reaction conditions; the firm will launch commercial production within a year of this work being completed.

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Growth potential of surfactants in Indian soap industry

S.K. SURI *
Chemistry Department, Indian Institute of Technology, Hauz Khas, New Delhi-110 016.

The history of the soap industry in India goes back to the er part of the 19th century but it established its separate tity during the last four to five decades only. At present ere are around 48 units in the organised sector manufac-ing toilet soap (TS). The manufacture of laundry soap (LS) s been reserved for the small scale sector and cottage sector. is estimated that the laundry soap usage accounts for almost)% of the total washing product market in the country.

The average per capita consumption of toilet soap and bric washing products (and hence laundry soap) in India woefully low -- lower than that in a number of developing ountries. This, however, is likely to increase sharply in view the increasing population, increasing literacy level and con-iousness for personal hygiene, rising level of per capita come and increasing urbanisation and sophistication in daily fe.

The toilet soap market in India in 1986-87 was close to ,60,000 MT. This has been projected to grow at a rate of bout 9.5% per year and is expected to reach 3,74,000 MT y 1990-1991 and 9,14,000 MT by the year 2000 AD. The roduction of laundry soap in 1986-87 was approximately ,50,000 metric tonnes. Its demand has been projected to ,90,000 MT by 1990-91 and 17,00,000 MT by the end of 000 AD. Table 1 gives the projection of total soap market nd per capita consumption of soap in the forthcoming years.

Toilet soaps contain total fatty matter (TFM) ranging from 3% to 82% while in laundry soaps, the fatty matter is etween 30-65%. This fatty matter is derived from oils and ats from renewable resources. The major soapary oils avail-ble in India are Rice Bran, Mowrah, Coconut, Castor, Karanjia, Kusum and Neem. A blend of these locally avail-ble oils with the imported fatty acids/crude palm stearin is sed as raw material in the Indian soap industry. Currently, rice bran oil (RBO) has a capacity close to 3 lakh tonnes er year. It has a potential to double in the country if milled hrough shellers and the conventional huller milling is dis-couraged. The availability of RBO for soapary purposes will also depend on the proportion of its production used for the production of edible grade oil.

India is the largest producer of castor oil. With improved agricultural practices, adequate scope exists for increasing the production of castor oil for both exports and domestic consumption. The non-traditional forest seed oils from Sal, Mowrah, Neem, Karanjia, and Kusum do not exceed one lakh tonne per annum although its potential is much higher. The import of animal fats (mutton/beef tallow) for the manufacture of soaps is banned in India. The domestic production of tallow is estimated at 30,000 MT and it is used mainly for the manufacture of laundry soaps.

The total oil demand and availability scenario for the Indian soap industry is shown in Table 2. Normally the gap is filled by the import of oils and fats. During the year 1986-87, the import of soapary oils was to the tune of 1,00,000 MT. It is envisaged that the availability of indigenous oils and fats for soap industry will fall almost 24% short of demand by the turn of the century and warrants the need to restructure existing soaps to lower TFM.

A close examination of soap usage in India reveals that about 50% of the soap produced is wasted to overcome the effect of water hardness. In view of this and also the gap between the demand and indigenous availability of soapary oils and fats, the Bureau of Indian Standards is taking steps to change the manufacturing standards of both laundry and toilet soaps by basing them on performance rather than on composition. The Government is also advocating the review of various technical options of structuring soaps at lower TFM and encouraging usage of surfactants that are good lime soap dispersing agents viz. alpha olefin sulphonates, fatty acid methyl ester sulphonates etc. for partial replacement of soapary fat charge.

PROJECTED DEMAND FOR SURFACTANTS IN SOAP INDUSTRY

Sodium Lauryl Sulphate (SLS), Coco-mono Ethanolamide (CMEA) and Coco-di Ethanolamide (CDEA)

On the average, Indian toilet soap is not quality-wise comparable to average quality of soaps made in other developed countries. Quality improvement has been a continuous process and the material composition of soap has changed from time to time. In the popular and premium grade toilet soaps (i.e. better quality toilet soaps) 0.5% to 1.5% of surfactant [mostly sodium lauryl sulphate, coco-mono ethanolamide or coco-di ethanolamide] are added: (i) to reduce the harshness of soap and make it feel soft; (ii) to obtain a homogenous dispersion of perfume; and (iii) to get a foam boosting effect. With the increase in sophistication in daily life, the consumption of better quality toilet soaps are on an increase in absolute and relative terms. It is estimated that

* Dr. Suri has worked as Head of Surface Chemistry at Hindustan Lever Research Centre, Bombay and then as General Manager (Technical) at Oswal Agro Mills, Ludhiana. Presently he is on the teaching faculty of Indian Institute of Technology, New Delhi and also consultant.

only 20% of the total toilet soap production conformed to better quality soap. A suming that proportiion increases to 30% by 1990-91 and 50% by 2000 AD, the projected demand of SLS (at 1% level of incorporation) for toilet soap industry during 1990-91 would be around 1,100 MT growing to more-than 4,500 MT by 2000 AD (Table 3). The total demand of CDEA and CMEA is also expected to be of the same order of magnitude.

Sodium lauryl ether sulphate (SLES)

In a few superior quality laundry soaps, small amount (1%) of SLES is added to improve the foamability and fatty oil detergency. At present, this practice is confined to an insignificant fraction of the total laundry soap produced and accounts for a consumpton of about 60 MT of the surfactant. The proportion is likely to increase only slightly and the projected demand of SLES for the purpose is expected to be around 80 MT by 1990-91 growing to over 300 MT by 2000 AD.

Alpha olefin sulphonates

Amongst the surfactants that are compatible with soapary oils and fats, alpha olefin sulphonates appear to be the most economical proposition. In view of its superior cleansing power, high foamability and relatively poor sensitivity to water hardness ions, it has a good potential in laundry soaps. Recent studies by the Khadi and Village Industries Commission (a semi-governmental body responsible for promoting and assisting the laundry soap industries) have established that AOS can be successfully incorporated in laundry soaps to formulate a 'Combo Bar'. Preliminary trials have shown that a restructured soap having a TFM of 25-30% with an AOS usage level of 4-5% exhibits performance parameters similar to a 46% TFM laundry soap bar.

In the light of these studies, some laundry soap manufacturers have restructured their brand name products and have started incorporating AOS therein to achieve a partial replacement of TFM. It is estimated that the concept of replacing around 10 to 15% of TFM by incorporating 4 to 5% AOS would have an immediate penetration of about 15% of the total production of laundry soap, growing to 20% by 1990-1991 and 40% by 2000-01. Based on this assumption, the projected demand of AOS for laundry soap industry would be around 7,000 MT in 1990-91 growing to over 17,000 MT in 1995-96 and 27,000 MT by 2000 AD (Table 3).

Since AOS is mild to skin, highly foaming and easily degradable, it is highly effective in toilet soaps for pa replacement of relatively more expensive coconut oil. use of AOS in the toilet soap also increases the fragr solubility and imparts a 'bounce' to the perfumed cake. M toilet soap manufacturers in India viz. M/s. Godrej Soa Ltd., M/s. Tata Oil Mills Company Ltd., M/s. Nirma Ch ical Company, M/s. Oswal Agro Mills Ltd., and a l number of medium to small scale toilet soap manufact have been incorporating AOS in their brand name of t soaps for more than one year as a lime soap dispersing a effectively avoiding the wastage of soap under hard w conditions. It is learnt that recently M/s. Hindustan Lever have also started incorporating AOS in their popular and mium grade toilet soaps. Some of the manufacturers restructured the soap by reducing the fatty matter by a 10 to 15% and substituting that by AOS (4 to 6%) the saving on the consumption of soapary oils. It is estim that during 1988-89 the partial replacement of cocon and a decrease in TFM was accomplished by restructi of 20% of the total toilet soap production. Assuming tha proportion grows to 30% by 1990-91 and 50% by 200 the projected demand of AOS for toilet soap industry w be around 4,000 MT in 1990-91 growing to 9,200 M 1995-96 and 16,000 MT in 2000 AD.

Other surfactants

In the forthcoming years, there is every likelihood t fraction of the toilet soap market would be controlle surfactant-soaps combination and soapless soaps i.e. bars made from synthetic surfactants. During 1987, al 15% of the toilet soap market in USA was controlled by thetic surfactants and surfactant-soap combinations. major surfactants used were sodium salts of fatty alcoho phates (AS) and alkyl glyceryl ether sulphonates (AC It would be reasonable to assume that by 1995-96 AD, ar 1% of the toilet soap market in India would be contr by synthetic soaps and surfactant-soap combination and market growing to 5% by 2000 AD. Based on this ass tion, one would envisage a demand of 18,000 MT of phated/sulphonated surfactants for the purpose. The der potential of various surfactants in soap industry is sum ised in Table 3. It is estimated that the requirements of factants by soap industry would be around 13,300 1990-91 growing to around 34,000 MT by 1995-96 and 70,000 MT by 2000 AD.

Table 1
Projection of Soap Market and Per Capita Consumpton of Soap in India

Year	Projected Soap Market ('000 MT)			Per Capita Consumption** (kg/annum		
	LS*	TS	Total	LS	TS	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1988-89	735	306	1041	0.89	0.37	1.26

	(2)	(3)	(4)	(5)	(6)	(7)
90	785	342	1127	0.93	0.40	1.33
91	890	374	1264	1.04	0.43	1.47
-92	950	409	1359	1.09	0.47	1.56
-93	1014	447	1461	1.14	0.50	1.64
-94	1082	489	1571	1.19	0.54	1.73
-95	1154	535	1689	1.25	0.58	1.83
-96	1232	585	1817	1.31	0.62	1.93
-01	1700	914	2614	1.65	0.89	2.54

Assuming a 60:40 ratio in usage of synthetic detergent and laundry soaps in the total washing substance market. The Scenario however is likely to change in favour of synthetic detergents.

Assuming population of India in 1987 = 800 million. Growth rate = 1.8%

Table 2

Projected Demand and Indigenous Availability of Soapary Oils

ar	Projected Demand* @ 40 TFM (LS) & 76 TFM (TS) ('000 MT)	Indigenous Oil availability ('000 MT)	Demand Supply** ('000 MT)	Shortage %
89-90	631	563	68	10.7%
90-91	704	624	80	11.4%
91-92	760	665	95	12.5%
92-93	819	708	111	13.6%
93-94	885	745	140	15.8%
94-95	955	789	166	17.4%
99-2000	1512	1148	364	24.1%

Scenario is likely to change with production of low TFM soaps and change in wash habits from laundry soaps to synthetic detergents.

The extent of conversion of oils to edible grade is likely to increase.

Table 3

Projected demand (in metric tonnes) of various surfactants in soap industry

ear	AOS						
	In LS*	In LS**	Total	AS* (SLS)	SLES (in LS)	FAES, LABS, CDEA, CMEA, AGES, Sarcosinates, Sulphosuccinates etc.	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1988-89	-	2142(2)	2142	765(25)	60	765	3732
1989-90	4710(15)	2992(20)	7700	940(27.5)	69	940	9649
1990-91	7120(20)	3927(30)	11047	1122(30)	80	1122	13371

(Contd on p 96)

(Contd from p 93)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1991-92	9500(25)	4867(34)	14367	1329(32.5)	91	1329	171
1992-93	11356(28)	5865(37.5)	17221	1565(35)	105	1565	204
1993-94	13417(31)	6930(40.5)	20347	1835(37.5)	121	1835	241
1994-95	15232(33)	8050(43)	23282	2140(40)	139	2140	277
1995-96	17248(35)	9215(45)	26463	2719(42.5)	160	4594	339
2000-01	27200(40)	15995(50)	43195	6460(50)++	300	20960++	7091

Values in parenthesis indicate the percentage of total production in which the surfactant has been incorporated

* at 4% level of incorporation in the product
** at 3.5% level of incorporation in the product
\+ at 1% level of incorporation in the product
++ Requirement for / a part of requirement also for toilet bars made from synthetic surfactants and surfactant soap combination.

Science Briefs

TIONAL INSTITUTE ANNED ON SUPERCONDUC-VITY

The apex body of the national superductivity programme meeting under chairmanship of the Prime Minister, r. Rajiv Gandhi, on July 20, approved Rs. 15 crore outlay for 1989-90 and ade projections for the Eighth Plan ith an outlay of Rs. 70 crores towards search in superconductivity. The apex dy accepted, in principle, the propol for creating a national institute for perconductivity applications during e next Plan.

This was the second meeting of the ex body after it was set up in June 987 soon after the Indian researchers hieved some measure of success in e emerging revolutionary field of high mperature superconductivity (HTSC). he 19-member high-power body viewed the progress in the national rogramme as coordinated and implemented by the Programme Management oard of the Department of Science and echnology headed by Prof. C.N.R. ao, Chairman of the Science Advisory ouncil to the Prime Minister.

The apex body includes the Minister f Human Resource Development, Minister of Finance, the Minister of State for Science and Technology, the Finance Secretary, the Cabinet Secretary, Secretaries of the Department of Atomic Energy, the Department of Electronics, the DST and the Defence R & D, Chairman of the University Grants Commission, Director General of the CSIR, Prof. M.G.K. Menon, Prof. C.N.R. Rao, Dr. P.K. Iyengar, Prof. S.K. Joshi, Dr. K.L. Chopra, Chairman of the Semiconductor Complex Ltd. and the Director (Technical) of the Bharat Heavy Electricals Ltd. Since the programme management board is under the DST, its Secretary, Dr. Vasant Gowariker, is the member secretary of the apex body.

Recommending that the ongoing research programmes be strengthened, the apex body decided that some short-term superconductivity technology demonstration projects would be initiated and completed in the next two years. It was suggested that a few long-term application projects leading to industrial products be initiated in association with the industry.

Additional investment

Of the approved outlay for the current year, the DAE, the CSIR and the DST would receive Rs. 3 crores, Rs. 5 crores and Rs. 7 crores respectively. The Rs. 70 crore investment for the Eighth Plan was proposed to be utilised in basic research and applications roughly in the ratio of 1:3. An additional investment of 50 per cent of the Eighth Plan outlay could be expected from the industry.

During 1988-89 the board through the two task groups it had constituted in March 1988, had identified and funded 56 projects/ groups involved in 32 institutions. Of these 38 were engaged in basic research and 18 in HTSC applications. The estimated expenditure on NSP in 1988-89 is around Rs. 11.4 crores. Apart from this a broadbased R & D and manpower training programme in superconductivity has been launched by the UGC with an outlay of Rs. 2 crores.

The major equipment like special furnaces for the fabrication of new ceramic oxide materials, high-precision measuring equipment, material, structure determination packages, X-ray analysis equipment, etc., granted under the programme had been ordered but were yet to be delivered, said Dr. Gowariker. The R & D work under the board so far, had been conducted using the existing equipment and infrastructure.

Significant efforts

In terms of achievements in basic research, significant efforts had been made to synthesise and characterise materials which become superconducting at liquid nitrogen (minus 196°C or 77 K) and higher temperatures. The materials predominantly belonged to the so-called 1-2-3 compounds, based on yttrium oxide, bismuth and thallium compounds. New series of materials, particularly copperless nickel based compounds, have been studied. Noteworthy experimental and theoretical work had ben carried out contributing to a better understanding of the mechanism of HTSC. "From the viewpoint of technology 1-2-3 and bismuth compounds are still the best," said Prof. Rao.

Several groups have been able to achieve bulk-up to a few kg -- production of 1-2-3 compounds and the method developed by the IIT, Madras, is significant in this. Though the Indian Rare Earths Ltd. had been given the mandate to productionise yttrium oxide in large quantities it has not begun to do so and the requirements are being met through a one-time import of 50 kg of the material.

On the applications front, technological capability in terms of fabrication of films, wires, tapes etc. had to be strengthened, said Prof. Rao. Though some success had been achieved in thin films there was a need to improve on it, he added. "Lot of work and lot of publications have resulted but now we need to concentrate on specific areas like high current electronic devices", said Dr. P.K. Iyengar. Though current densities of the order of 10,000 amperes/sq.cm had been attained by Indian researchers this had so far been in small area configurations and stability of such materials also needed to be demonstrated. "Stability of material is important for production of technology. More exacting work is needed in this respect. From that point of view we should even concentrate on low critical current density devices. High current density is a matter of development," said Prof. Rao.

According to Dr. Iyengar there has been no focus so far on magnetic field effects on HTSC materials from the point of view of technology applications. These new materials have been found to expel magnetic field unlike the so-called flux-pinning effects of conventional low temperature superconductors. Both Prof. Rao and Dr. Iyengar were of the opinion that new alloy structures had to be studied for such pinning mechanisms which would be useful to fabricate high temperature superconducting magnets.

The kind of devices that seemed feasible presently with the HTSC materials would be largely based on junction properties of these new materials which have been intrinsic to them, rather by design, Dr. Iyengar said. These would include IR detectors, microwave components, bolometers, millimetre wave detector, Superconducting Quantum Intereference Devices (SQUIDS) etc. Major thrust in this direction was likely to be given in the R & D programme for 1989-90.

What had, however, emerged was a new perspective of the field of superconductivity, low temperature science and technology and materials science as a whole, not just HTSC, said Dr. Gowariker. "We have been doing high temperature superconductivity in a kind of vacuum trying to fill gaps of instrumentation, materials -- particularly ceramic technology and experimental infrastructure in general through superconductivity. This is not the right way to go about it. These should have been developed all along to be exploited for HTSC work like it is happening in Japan, for example, said Prof. Rao.

From this standpoint, the need to give thrust to R & D work in the area of low temperature technology was perceived by the apex body. Special R & D programmes to build low-temperature (upto 20 K) magnets with conventional superconductors of the old kind were likely to get a major thrust in the coming years. A joint programme involving the DRDO, the Central Electronics Ltd., Department of Space and the BHEL had been mooted to develop low temperature magnets that could for example, go into the making of magnetic resonance imaging (MRI) systems for medical applications. Bharat Heavy Electricals had taken up a project to make a 5 MW prototype superconducting generator.

IICT DEVELOPS DRUGS FOR CANCER TREATMENT

The Indian Institute of Chemical Technology (IICT) at Hyderabad has launched a major programme to develop technologies for almost all anti-cancer agents. IICT had developed Etoposide, the drug widely used for the treatment of lung cancer, from phodophyllotox isolated from the Indian plant podophyllum emodii (which is grown in the Himalayan region).

This technology was passed on to a pharmaceutical firm. Production is expected to commence in a year's time, Dr. A.V. Rama Rao, IICT director said. The Institute had already completed research and given to a pharmaceutical company for commercialisation of mitoxanthrone, which is considered as the poor man's adriamycin (used extensively for the treatment of various types of solid tumours and breast cancer). In addition, it has initiated programmes on six projects which would be completed within the next two years.

Dr. Rama Rao said that most of chemotherapy reagents were imported at exorbitant prices making them beyond the reach of the common man. In view of this, IICT has launched the programme. The institute undertood process development for some of the essential drugs. Poisoning due to excess of iron in infants is encountered in rural areas known as thalassamia, however the effective drug '1,2-dimethyl 1,3-hydroxy pyrid-4-one' is not made in the country. A process developed by IICT has been transferred to an Indian company for commercialisation b end of the current year, he said.

The indiscriminate use of phos ous based pesticides caused or phosphorous poisoning among fan The only drug known as 'Pam' (ma as injection vials) is being import an exorbitant price. IICT has wo out a process for Pam and it is exp to be commercialised by 1990. Institute has launched a programm develop technologies leading to a class of carbapenem antibiotics. It initiated the synthesis of some of drugs starting from chiral intermedi For example, timolol, a drug wi used for glaucoma had one asymm centre in its molecule and one o enantiomers had this specific acti

IICT has worked out a comm cially feasible process for obtainin right enantiomer starting from mann The process has been passed on to of the Bombay-based pharmaceu companies for commercial exploita he said. At present, timolol is b imported at a price of more than Rs. per gm (approximately Rs. 2 lakhs kg). Incidentally, the world patent timolol had expired and the Indian c pany could exploit this technology only to meet the internal requirem but also part of the world by wa exports. By the same approach, IIC now concentrating on the synthesi S-propranol which is the real b blocker, he added.

BIOGAS FROM WILLOW DU

A new feedstock, namely wi dust, an industrial waste has succ fully been tapped as an alternativ produce biogas by large size pla There is marked improvement in technology and support facilities producing economically and efficie sizeable quantities of biogas and org manure. In addition, it helps to solve problems of pollution, disposal of l quantity of willow dust, a waste chu out by cotton spinning mills on day

basis. This heralds the entry of as production and utilisation in the on textile units in the country. The partment of Non-Conventional rgy Sources (DNES) through its gas Research Centre at College of hnology and Agriculture Engineer-, Udaipur has developed, designed l set up such a plant at Udaipur tton Mills, Udaipur. The biogas plant a capacity to produce 20 cu. mt. of per day. The biogas plant consists three batch digestors of 20 cu. mt. h. The technology has several innov-ve and beneficial features in terms of antity of gas generation, better qual- of manure, reduction in the duration slurry drying up as manure within e days as compared to 10 days in the se of dung based slurry.

The provision of recirculation of gas d water in the digestor for stirring ads to increased gas production. The ant also provides for self-loading and nloading facility systems to separate ater from slurry and its re-use for fil-ng the plant. The Udaipur Cotton Mills roduces 125 kg of willow dust per day f which 100 kg is adequate to operate ne plant. The gas produced from the lant is equivalent to 80 kg of wood quivalent per day. The gas produced is fficient to meet cooking requirements f the mill's canteen. The production of ry manure is 2.5 tonnes per month alued at Rs. 1,250. The slurry is a rich nanure as it contains 1.5 to 1.7 per cent itrogen.

The plant provides for cost savings ncurred by textile mills on lifting, ransporting and dumping the willow ust at distant places and the big chunk f land required for such disposal. The economy in use of land is reported to be nine times. The traditional method of disposal of willow dust is unhygienic, pollutes environment through foul smell as the willow dust takes one year to decompose into organic manure. The plant is quite economical since its cap-ital cost is about Rs. 90,000 and the benefits accruing are qualitative and manifold.

It is felt that most of the cotton spinning mills in the country can set up such biogas plants and reap benefits of new technology developed by indigenous efforts. A number of units under National Textile Corporation have evinced keen interest in setting up of such plants.

LASER DETECTOR TO MONITOR OIL SLICKS

Lasers are enabling scientists who assess oil slicks to make accurate measurements of the extent and thickness of spilt oil. Once the prototype for the detector is fully developed, it should dramatically improve techniques for monitoring and cleaning up oil in oceans and rivers. At present, people monitor oil slicks visually, either by plane or by boat, but this method is unreliable because many other features on water can resemble a slick. Even highly experienced observers are frequently fooled by so-called "wind slicks" -- areas of calm beyond a stretch of water whipped up by the wind -- and by patches of water whose varying temperatures give them different colours.

The team that developed the laser detector drew its members from two organisation within the Canadian government -- Environment Canada and the National Research Council -- and from Esso Resources Canada and the U.S. Minerals Management Service. The researchers claim that the detector is not fooled by "false" slicks and that it gives more precise information than a trained eye about the extent and thickness of spilt oil. It would enable those who clean up after an oil spill to use their equipment and resources more effectively, they claim.

The prototype for the detector consists of three basic components: two carbon dioxide lasers and an interferometer. One laser heats the slick, causing it to vibrate. The frequency of the vibration depends on the thickness of the slick. Light from the second laser strikes the heated spot and rebounds back to the interferometer. Because the heated spot is vibrating, the reflected light will be at a slightly different phase from the incident light and the two will interfere with each other. The degree of interference provides a measure of the vibration of the heated oil and hence its thickness. The team hopes to develop a refined model for full field trials next summer. The detector is likely to be one-tenth the price of existing ultraviolet and infrared sensors.

CUTTING THE COST OF DNA TESTING

Ayush Morad Amar, a leading Brazilian forensic scientist and a professor at the University of Campinas, is developing a chemical alternative to the DNA Fingerprinting technique developed by Britain's Alec Jeffreys. Jeffreys' test -- which makes use of a radioactive probe containing ^{32}P to produce an image of the DNA -- is frequently used in paternity suits and in determining the identity of murderers and rapists. If successful, the new method would be significantly cheaper than the Jeffreys process and would open DNA testing to more developing countries, where handling of radioactive material can be difficult and expensive.

Access to such material is closely controlled in Brazil, so much so that Amar, who has a concession from Jeffreys to carry out DNA Fingerprinting in Brazil, can only reach the stage immediately prior to application of the probe, i.e. the electrophoresis of the DNA after the cell has been broken up by enzymes. Then he must send the sample to the U.S. to be subjected to the probe in the laboratories of Cellmarke Diagnostics (Germantown, MD), a division of ICI Americas. Amar's idea is to replace the probe with a dye, which he declines to identify, though he acknowledges that "it is not biotine", which other labs are studying.

News From Abroad

LL TO BOOST TPE PRO- TION WORLDWIDE

oyal Dutch/Shell the leading moplastic elastomers (TPE) pro- r plans to boost worldwide capac- 39% to 320,000 M.T./year. It plans pend $170 million in the venture, ying fears of over-capacity in the ket.

n the U.S., Shell plans to debottle- k its existing capacity at Belpre, OH ing around 20,000 M.T./year new acity. A third Kraton-G hydrogen- d TPE unit of 50,000 M.T./year, is ected to come on stream at the lpre in the mid-1990s.

Worldwide Shell will boost capacity Berre, France by 25,000 M.T./year to ,000 M.T./year by 1990; in Wessel- g, Germany, it is upping capacity from ,000 M.T./year to 55,000 M.T./year. dditional investments to be made in rre, to launch Kraton-G production, r the first time in the world outside e U.S. In Japan joint venture with pan Synthetic Rubber is due on ream at Kashima in the fourth quarter 1989.

Enichem plans new plants in U.S. in int ventures with Arco, and newcom- s Dow and Exxon. U.S. demand for PE forecast at 145,000 M.T./year and xports of 30,000 M.T./year in 1991 are ay below projected capacity of ,48,000 M.T./year in 1991 according Chem Systems forecasts. In 1991, European demand and exports should each 163,000 M.T./year against capac- ty of 230,000 M.T./year. Japanese demand and exports should reach 4,000 M.T./year, against projected capacity of 50,000 M.T./year.

Shell doubts if its competitors will meet announced start-up dates, and expects demand to go up by 10%/year for its proprietary grades in asphalt modifiers, hot melt adhesives and impact resistant polymer additives. Less than half of Shell's production goes into footwear, the least attractive outlet.

BRAZILIAN PRODUCER MOVES INTO U.S. PVC MARKET

Brazil's leading PVC producer, Companhia Petroquimicia Camacari (CPC) is committing itself to supply in U.S. customers PVC on long-term basis. In 1988, U.S. demand totaled around 8.5 billion pounds of which only 140 million pounds was met by imports. To-date overseas producers have sold into the U.S. only on short-term and spot basis.

CPC has entered into a partnership with a Philadelphia firm, International Trading Corp. (ITC) that is to provide local warehousing, distribution and sales services. ITC president, sees a bright future for CPC's Norvic PVC: "It's not a secondary product, it's based on state-of-the-art BF Goodrich and Mitsubishi technology...."

Current operating rates for U.S. PVC producers is around 92% with 11-12 inventories. Prices are steady at 44-46 cents/lb for pipegrade, while export levels are 35-37 cents/lb. The demand-growth forecast is about 4%/year but could follow patterns of PVC usage in construction, which could push up demand growth upto 7%-8% per year.

CPC will soon bring its PVC capacity upto 420,000 M.T./year. Last year the company exported a total of 140,000 M.T. and expects this to rise to 180,000 to 200,000 M.T. in 1989.

CALIFORNIA TO PAY FOR PART OF WASTE-SITE CLEANUP

A Los Angeles jury has for the first time held California liable for part of the clean-up costs of the state's Stringfellow Superfund site -- a decision with a far-reaching impact. An estimated 34 million gallons of hazardous waste were dumped at the 17-acre site near Riverside CA, between 1956 and 1972, by several companies, to name a few, Stauffer Chemical, Quantum Chemical, Montroce Chemical (Los Angeles) and major corporations like Northrop & General Electric. The site was licensed by the State Regional Water Quality Control Board.

The jury found the State negligent in supervising construction, creating a nuisance situation and dangerous conditions, breaching mandatory duties, and delaying cleanup. But it did not fault the state for choosing, investigating and designing the site, nor did it cite the state for failure to remediate it. Most recently the State has spend a considerable sum to make it a model cleanup. The site has been capped, and contaminated water is pumped and treated at a plant on the site.

ASBESTOS VERDICT AGAINST DU PONT UPHELD

The New Jersey Supreme Court has upheld a 1987 jury verdict that Du Pont deliberately concealed medical information indicating six of its workers had signs of asbestos-related disease. The current and former Du Pont employees have been awarded a total of $1,382,000 in compensatory and punitive damages.

The workers originally exposed to asbestos, in the 1950s at Du Pont's Chambers works, and Rapauno plants were informed by Du Pont in 1978 & 1979, that they had asbestos-related disease. But the 1987 jury found that the medical X-rays taken by Du Pont's doctors contained signs of asbestos-related conditions as early as 1965. "There was a corporate plan to withhold diagnosis of asbestos disease" it was alleged.

U.S. workers generally cannot sue their employees for work-related injuries, and must settle such claims under the "Workers' Compensation Act",

which does not provide for punitive damages. This was the first time that an employee in New Jersey had attained a jury verdict versus an employer for work-related injuries.

Two of the six workers involved in the suit still work at Du Pont. One of them has died and three are retired from the company. However, all the workers have or had some type of asbestos-related disease.

OXYCHEM TO CLEAN UP LOVE CANAL

OxyChem has acknowledged responsibility for clean-up of some of the waste, at the Love Canal hazardous-waste site (Niagara Falls, NY), the first time ever, ever since the area was declared a disaster area in 1978. It has signed a consent order with New York State and the Federal Government to supervise storage and destruction of wastes generated from cleaning contaminated creeks and sewers near the site. But the company continues to fight its liability for this national disaster.

The cleanup plan proposed by the company, last year, will call for interim storage and incineration of contaminated materials from Love Canal, as well as the nearby Durez site and the North Tonawanda sewer system. The company also takes responsibility for wastes generated by the leachate facilities, constructed to treat runoff from the main mass of wastes.

The agreement will save taxpayers more than $20 million in construction, operating and engineering costs. It also plans to burn liquid wastes at an existing incinerator in its Niagara Falls plant, to construct a rotary kiln to burn sludges and solids.

ZEON CHEMICALS VENTURES INTO U.S. ELASTOMERS MARKET

Nippon Zeon (Tokyo) through its wholly owned Zeon Chemical subsidiary has ventured into U.S. chemical business. Recently it agreed to purchase BF Goodrich's elastomers business, and in March began construction on a 1500 M.T./year hydrogenated nitrile-butyl rubber (HNBR) plant in Bayport, Texas, scheduled to come on stream in April 1990.

The acquisition makes Zeon the number one producer of epichlorohydrin, since BF Goodrich was the sole U.S. manufacturer of that product. Future growth of elastomers in Japan is however seen as limited. The strong yen is encouraging automotive producers to transfer production outside of Japan.

REXENE'S PLANS ARE F AGAIN

In anticipation of complet corporate refinancing, Rexen (Dallas, Tx.) declared a $7 spe idend and also increased its quarterly dividend by abou Rexene had planned to fina payout by borrowing $425 mill to pay those creditors by sel undisclosed company assets.

But a temporary restrainin against making any regular or dividend, or selling any of the ny's assets in order to pay for halted those plans atleast for n

The restraining order was so a group of current and former e ees who are suing the company, ing a stock bonus plan. The alleges it was promised and shou received equity positions in th pany equal to those of senior m ment.

The company has rejected a ment proposed by the plaintif would have cost Rexene $74 n The company says it will pre counter offer at a meeting late shine Mining Co. had attemp acquire Rexene early this year, b deal fell through.

Book Review

ERNATIONAL DIRECTORY PLASTIC TECHNOLOGY AND CHINERY: Granth Vitaran (107, krupa, Behind National Chambers, ram Road, Ahmedabad 380 009. ne: 401931-32.) Price Rs. 300.

lastic Processing is one of the fast-leveloping sectors anywhere in the ld. In India today we are processing e than one million tonnes of vari- plastic materials like LDPE, DPE, HDPE, PVC etc. Regenerated stics produced by recycling of the ste might further add up to the ton-e estimated as being consumed by processing sector. Recent additions his field include engineering plastics : Nylon-6, ABS, PTFE etc. Efforts already afoot to introduce polycar-nates and polyacetals in the Indian rket.

These plastics find variety of uses m consumer sectors to industrial plications. The recent declaration of e Government to patronise plastic fur-ure has opened up tremendous oppor-nities in this direction. Ever increasing mpetition on the other hand is open-g up new applications in the field of ckaging to provide better and attrac-ve presentation over and above the nctional requirements of production. creasing cost of energy has made a variety of applications of engineering plastics in the field of automobiles, electrical engineering, fabrication and machinery parts more and more attractive. With the increasing demand, the end product and also the processing technology has become quite sophisticated. There are a variety of machines available in India produced by leading manufacturers like Kolsite, Klockner-Windsor, Brimco etc. And yet the processing sector has to depend upon imports for some highly advanced and sophisticated applications. This has given rise to altogether different type of information needs for the Corporate Planning Managers and Project Engineers for obtaining various machines required by them. A number of times considerable effort is required to locate a correct source of machinery resulting into time and financial cost.

The present publication 'International Directory of Plastics Technology and Machinery' is an effort to bridge the information gap. The publication presents more than 4200 addresses covering the countres like USA, West Germany, Japan, UK, Italy etc. The addresses are duly classified according to the products manufactured by the company into 306 product groups. The product index given at the back of the Directory facilitates to find out the information about the companies manufacturing a particular product. Out of 4202 companies covered, 659 are from India, 1470 from USA, 617 from West Germany, 547 from UK, 287 from Italy, 46 from Japan and 576 from the rest of the world making the directory international. The information has been carefully compiled by the editor Shri D.L. Pandya who is a Chemical Engineer and runs a plastic processing industry. Apart from the information on the machinery and technology suppliers, the author has also covered latest trends and methods in the plastic processing sector making the book considerably useful.

The book has been divided into five chapters. Chapter 1, titled 'Introduction to Plastics Processing & Machinery' gives a brief account of various processing operations involved in plastic manufacture. The second chapter highlights the recent trends in machinery used in processes such as injection, rotational and blow moulding, thermoforming, extrusion, etc. The Directory section listing processing machinery manufacturers around the world forms the heart of the book.

The book is a commendable maiden venture and should set the trend for a number of similar directories. It should serve as a valuable reference to entrepreneurs, project engineers and corporate planning managers.

Company Notes

GSFC DOING WELL, PLANS EXPANSION

Gujarat State Fertilisers Company (GSFC), a well-diversified company, has been doing well in the current year. It is going ahead with its various expansion and diversification programmes and hopes to do quite well in the current and future years. According to Mr. P.V. Swaminathan, managing director, the product diversification policy followed by the company in the past has paid dividends. All its projects are based on the raw materials readily available.

For the 15-month period ended March 1989, the company has already announced an equity dividend of Rs. 3.75 per share. It has achieved a record production of 14.52 lakh tonnes of fertilisers (4.81 lakh tonnes of urea, 6.25 lakh tonnes of DAP and 3.45 lakh tonnes of ammonium sulphate) during the 15-month period, showing a rise of 43 per cent on an annualised basis as compared to 8.13 lakh tonnes in the previous year. The production of caprolactum, nylon-6 and argon has also been substantially higher than in the previous year.

The company is going ahead with its various expansion and modernisation projects. The capacity of caprolactum is being increased from 20,000 tonnes to 70,000 tonnes, by setting up a new unit of 50,000 tonnes. The cost of the expansion is Rs. 400 crores. Technology has been arranged from a Polish firm for intermediate products and BASF of West Germany for lactum. Work has been started in September 1988, and the new plant is expected to be commissioned by the end of 1991. Finance for the project has been tied up. Out of the foreign exchange component of Rs. 86 crores, 50 per cent will come from IDBI and IFC, while the balance from International Finance Corporation, Washington. For financing this project, a rights issue of convertible debentures of 157.5 crores was made. After the conversion of these debentures on August 11, 1989, the share capital will rise from Rs. 27 crores to Rs. 43 crores, while addition to the reserves will be of the order of Rs. 80 crores.

The cogeneration power project being set up, is in progress. The first generating set of 15 MW was commissioned in March 1989, and the second 25 MW is expected to be commissioned in March, 1990. This is a multi-fuel power project.

Current year

According to Mr. Swaminathan, all the company's plants are running satisfactorily. For the DAP plant at Sikka, imports of phosphoric acid were not available in the first four months of the current year. With assured supplies of the raw materials, the plant can be operated at 120 per cent. The DAP plant at Baroda, based on rock phosphate and sulphur is operating at 160 per cent capacity. If imports of phosphoric acid are arranged soon, the Sikka plant can make up the production loss.

The melamine plant, started in 1983 with a capacity of 5,000 tonnes is running at 100 per cent capacity. A letter of intent for another plant with a capacity of 10,000 tonnes has been received and the cost of the project is estimated at Rs. 60-70 crores. The total turnover in the current year ending March, 1990 is expected to exceed Rs. 500 crores. In four or five years, the company wants to achieve a turnover of Rs. 1,000 crores.

SM DYECHEM

SM Dyechem has reported excellent working results for the 18-month period ended February 1989, with manifold increases in both turnover and profits. The company has proposed to pay an equity dividend of 36 per cent for the period against 24 per cent paid last
The total outflow on account of
dend will be Rs. 66.53 lakhs ag
Rs. 23.75 lakhs. The dividend has
maintained to conserve resources fo
expansion and diversification pr
currently underway.

The company has achieved a turn
of Rs. 24.55 crores against Rs.
crores in the previous financial y
Gross profits have jumped f
Rs. 75.77 lakhs to Rs. 335.45 la
The net profit after depreciation
interest works out to Rs. 219.61 la
143% higher on an annualised b
than the previous year's net profit of
60.18 lakhs. Earnings per share h
more than doubled from Rs. 5.0
Rs. 10.82 on the company's enhan
capital. On an annualised basis, the
nings per share works out to Rs. 7

SM has expanded its product ra
of speciality chemicals for the te
industry, pharmaceuticals, pestici
leather and cosmetic industries and
also made a good start in consumer p
ducts. Its most prestigious project, in
petrochemicals field, of manufactur
ethylene oxide and MEG, is also a
very advanced stage. The company
signed an agreement with a scient
design company in the U.S., for the p
cess know-how and the basic engi
ering package. Project management a
overall co-ordination as well as detai
engineering and allied services will
provided by Toyo Engineering Inc
Supply of raw material, industrial alc
hol, has been assured by the Gove
ment of Maharashtra.

The company has another project
hand for the manufacture of three la
tonnes per year of methanol at Mach
ipattnam, Andhra Pradesh. The nece
sary tie-up for supply of gas wi
ONGC has been completed and effe
tive steps have been taken to impleme
one of the country's largest projects
methanol. This project will have mo
than 50% export component.

News from the American Market

EHLAND STUDIES MALEIC COST

Ashland Chemical is doing an ngineering study to determine hether capacity at its maleic an-ydride plant in Neal, WV can be rther expanded. The plant's ca-acity was already expanded by 0% to 63 million lbs/year last ear. When it was built in 1975, he facility was designed to pro-uce up to 90 million lbs/year of aleic anhydride using benzene echnology. The study, to be ompleted this summer, will de-ne the process economics of fix-d-bed versus fluid-bed technolo-ies, and engineering work on an xpansion project could begin by arly 1990, says Michael D. Kil-ian, vice president and general anager of Ashland Chemical's Petrochemicals Div. "The US ma-eic anhydride market is projected to exceed planned capacity by 1991. We believe we can econo-mically expand the plant at least one more time," he adds. Dom-estic maleic anhydride consump-tion was 410 million pounds in 1988. This year's production should far outpace the 425-mil-lion pound figures of 1988 becau-se Monsanto, Amoco, and Mobay are boosting plant output. World-wide maleic anhydride supplies are tight and several European producers are adding capacity. Orkem earlier this month said it will join with Monsanto to build a facility at Dunkirk.

DEGUSSA EXPANDS CATALYST PLANTS

Degussa is undertaking three projects to enlarge its catalyst business in the U.S. The com-pany will build a plant to manu-facture catalysts for fixed-bed chemical processes at South Plainfield, NJ, where Degussa also plans to construct a catalyst development and technical center. Until now, Degussa has imported catalysts for fixed-bed chemical processes from Germany. In an-other plan, Degussa will raise ca-pacity at the auto catalyst plant acquired from Air Products and Chemicals earlier this year.

A NEW PLANT IN NEW ENGLAND

Union Carbide Industrial Gases (UCIG) will build a $16-million air separation plant and liquefier in Suffield, CT, by late this year. The 620-ton/day plant will supply high-purity liquid oxygen, nitro-gen, and argon to customers in New England. Output is being especially targeted to "growing markets in the high-technology electronics and defense indus-tries," says E.G. Hotard, vice president for bulk gases at UCIG. The plant also will supply liquid gases to area health-services, food-processing, and chemical in-dustries.

TEXACO SNARES ETHOXYLATING PACT

Texaco Chemical and Ethyl have signed a long-term proces-sing agreement under which Texa-co will produce alcohol ethoxyla-tes at its Port Neches, TX plant using alcohol produced at Ethyl's Pasadena, TX facility. Texaco will market the alcohol ethoxyla-tes under its Surfonic brand name. The agreement, in effect, creates a fully integrated supplier of alcohol ethoxylates, which are a base material in household de-tergents, personal-care products, and industrial surfactants. In ad-dition to having ethoxylation ca-pacity of 250 million lbs/year, Texaco produces ethylene and ethylene oxide at Port Neches. For years, Texaco has had ethoxy-late tolling agreements with se-veral companies, including Ethyl, and this will be the first time Te-xaco will be able to market a wide range of its own alcohol ethoxy-late products.

GLOBAL POLYSULFONE MOVE

Amoco will triple its sulfone monomer capacity by early 1991, when it is scheduled to finish building a new plant at Augusta, GA. The monomer plant will feed international polymer facili-ties Amoco is currently expand-ing. Amoco is building a new compounding plant at Geel, Bel-gium that will start up later this year. Another compounding plant in Japan is in the design phase, and Amoco is designing two other polysulfone plants in Europe and Japan. Amoco expects demand for its Udel polysulfone, Mindel alloys/blends, and Radel polyaryl-sulfone to grow 12%-15%/year during the next decade. The new monomer plant is being construc-ted at the site Amoco acquired last year from Premark when it purchased Dartco's Xydar LCP business.

DOW RAISES CAUSTIC TAB

In a letter to customers, Dow Chemical announced a price in-crease of $20/ton for liquid caus-tic soda last week. Other caustic soda producers are expected to match the price hike. On June 1, Occidental Chemical increased its off-schedule prices for dry caustic soda by $1.00/hundred-weight, sparking speculation that producers would try to boost third-quarter tabs for liquid caus-tic.

JULY 1 PRICE HIKES

Momentum to institute price hikes for the third quarter is building. The Fine Chemicals Div. of Hoechst Celanese will raise prices for tank trucks of monochloroacetic acid in aqueous solution by 3 cts/lb to 51 cts/lb delivered. The division will also increase selected amine tabs by 3 cts/lb and boost prices for all grades of monocyclohexylamine and dicyclohexylamine by 5 cts/lb. Dow Chemical will raise prices for off-schedule propylene glycol products by 3 cts/lb and will increase list prices for propylene oxide by 4 cts/lb to 54.5 cts/lb. Dow's tab for Polyol 80 will rise by 6 cts/lb to 66 cts/lb. The Rubber Group of Polysar will raise prices for nitrile, polybutadiene (BR), and butyl rubber products in the U.S. and Canada; medium-grade nitrile will rise 10 cts/lb, and specialty-grade nitrile products will go up a minimum of 10 cts/lb. BR prices will rise by 3 cts/lb, although specialty BR will increase by cts/lb and butyl rubber prices will go up by 5 cts/lb for regular grade and 5 cts/lb for specialty and halobutyl rubbers.

MORE SODIUM CYANIDE FOR DUPONT

Du Pont is upping its ambitious 1988 plans to increase solid sodium cyanide capacity by 100 million lbs/year with new projects to raise worldwide production by another 40%, to 470 million lbs/year, by 1991. One of the world's largest producers of dry sodium cyanide, Du Pont has joined other companies in boosting capacity to meet the surging demand requirements of gold-mining companies that use the chemical to leach metal from ore. Du Pont (Australia) will build a 100-million lb/year sodium cyanide plant in Western Australia by third-quarter 1991. The company also will raise capacity at its Memphis, TN sodium cyanide plant by 25% to 250 million lbs/year by the second quarter of 1990. Two fastest-growing markets for sodium cyanide are the U.S. and Australia, where several gold-mining projects are under way, says Gerard J. Donnelly, cyanides business manager at Du Pont. To reduce investment costs and minimize the storage of hydrogen cyanide, a key ingredient in sodium cyanide, Du Pont will use new, patented technology.

SPECIALTY URETHANES JOINT VENTURE

Olin and Asahi Glass will join forces to market specialty urethane products to Japanese-owned autoparts suppliers and manufacturing plants in the U.S. The companies' 14-year-old joint venture, Asahi-Olin, operates one of the largest polyol plants in Japan and is a major supplier of materials for urethane interior automotive parts made in Japan. "Being a reliable and known supplier in Japan should aid us substantially in our expansion into the U.S. market," says Robert J. Martin, Olin's automotive products marketing manager. A primary focus will be to provide urethane chemical intermediates and systems that mirror the Asahi-Olin products, given Japanese automakers with plants in the U.S. use technology developed in their Japanese plants, Olin says. Products will be manufactured at Olin's plants in Brandenburg, KY and Lake Charles, LA

HENKEL BOWS OUT OF AQUALON

Hercules has signed a letter intent under which it will becon sole owner of the Aqualon Grou a producer of water-soluble pol mers currently owned jointly t Hercules and Henkel of West Ge many. Hercules will purcha Henkel's 50% stake in Aqualc by late June. Henkel will reta certain assets for the productic of methylcellulose in West Ge many but will toll-produce a po tion of Aqualon's requirements o an exclusive basis. Aqualon wi continue to produce methylcellu lose at Doel, Belgium. When th formation of Aqualon was firs announced in April 1986, ana lysts thought Henkel had the mos to gain because it would win ac cess to the U.S. market, shar Hercules' top market position and be able to offer a much broa der range of products. Hercules motives, they said, were less clear, but the company would a least gain access to methyl cellu lose production after years of try ing to devise a substitute with little success. The sluggish de mand-growth outlook and the high investment costs associated with water-soluble polymers has convinced many companies, including Du Pont, Procter & Gamble, and H. Kohnstamm, to exit from the business. Aqualon officially started on Feb. 1, 1987, and its sales rose 15% in 1988 to roughly $350 million. Pleased with results, the Aqualon partners said they had expected to continue the joint venture, but Henkel accepted Hercules' strategic commitment to emphasize core specialty chemicals businesses and agreed to sell its ownership.

ONE-POULENC UPGRADES BRES

Rhone-Poulenc has launched a 65-million investment program r its $1.5-billion/year fibers usiness to be carried out over e next four years. The French roup will spend $200 million odernizing its nylon and polyes- r filament production in Europe. lylon — where RP is a fully inte- rated upstream — will be the ain focus of the spending, while t pursues an upmarket niche stra- egy in the loss-making polyester ector. RP is also looking to cut osts by more closely integrating ts French, Swiss, German and Spanish fiber plants. A further $265 million is earmarked for RP's other fiber activities — including acetate tow, industrial fibers, non-wovens, and its Brazilian fibers business — with projects to be announced by the end of the year.

GLYCERINE PRICES RISE

Procter & Gamble Industrial Chemicals, Humko Chemical Div. of Witco, and Dow Chemical have have all raised their glycerine prices by 6 cts/lb. Procter & Gamble's price increases went into effect on May 13 and brought Superol USP with a minimum of 99.7% glycerine to 82 cts/lb. Humko's 82-ct/lb list price for the same product became effective on May 22. Dow's new list price for 99.7% USP is 84.5 cts/lb.

TENNECO TO BUILD SODA ASH PLANT

Tenneco Minerals, a subsidiary of Tenneco (Houston), will build a 75,000-ton/year liquid caustic soda plant and a 50,000-ton/year anhydrous sodium sulfite unit at its trona mine and soda ash processing plant near Green River, WY, by second-quarter 1991. The integrated plants will use trona ore as their raw material feedstock; the liquid caustic soda plant will use a process that avoids chlorine coproduction. Tenneco currently produces 1.15 million tons/year of soda ash and plans to debottleneck an addition 100,000 tons/year in 1990.

BIG JUMP IN PETROCHEMICAL STOCKS

U.S. production of all major petrochemicals rose in the first quarter compared to the same quarter of 1988, according to data compiled by the National Petroleum Refiners Association. At the same time, however, US petrochemical inventories on March 31 showed dramatic increases over stocks on the same date a year earlier. Ethylene inventories rose 76% to 22 billion lbs; benzene inventories were up 22% to 142.6 million gallons; chemical and polymer grade propylene inventories were 6.2% higher at 1.1 billion lbs. Benzene output jumped 15.3% in the first quarter to 473.5 million gal. and total ethylene output rose 5.1% to 9.7 billion lbs. Refinery-sourced propylene production rose 9.3% to 1.9 billion lbs, while coproduct propylene output inched up 3.4% to 2.8 billion lbs.

Technological Scene Abroad

THE EYES OF BASF

BASF has installed a $12-million environment control centre at its huge Ludwigshafen, West Germany site, which the company believes is the first of its kind to monitor such a complex area. The centre kept track of the facility's 2,200 emission stacks on its 350 different production units; 12 stations monitoring sulfur and nitrogen oxides, ozone, dust and organic carbon on and around the site, and wind direction, in case of toxic-gas leaks; 14 cooling-water release points into the Rhine river; toxicity controls on process water entering the water-treatment station; and noise levels. Containment of cooling water is possible in the event of pollution. In addition, six zoom-lens cameras watch for clouds from stacks and other incidents. Due to be fully operational next month, the centre is on the perimeter of the site, next to the fire station.

CHEAPER FEED FOR FARM ANIMALS

Studies indicate that livestock and poultry gain weight more efficiency when they eat high-oil corn than standard corn, cutting down on feed costs. That's because normal corn contains 4% oil and 9% protein, whereas high-oil corn contains 6%-8% oil and 10%-11% protein, according to Du Pont. So Du Pont and Pfister Hybrid Corn Co. are working together to develop improved strains of high-oil corn hybrids, with even more oil and protein, but with traits such as drought tolerance and disease resistance comparable to normal corn. The University of Illinois is contributing its own high-oil corn strains to the research. Du Pont will support R&D at the university, and Du Pont and Pfister will pay royalties on any of its hybrids that are commercialized.

A LITTLE SUN CAN WORK WONDERS

A titanium dioxide catalyst that could eventually be used to break down such water pollutants as PCBs, dioxins, pesticides, dyes, and cyanides has been found to work faster in concentrated sunlight, according to Sandia National Laboratories (Albuquerque, NM). In a test with 30 parts per million of salicylic acid — chosen because it's easy to measure and has properties similar to more hazardous chemicals — and hydrogen peroxide, Sandia says it found that light equivalent to normal sunlight brought acid concentrations down to the parts-per-billion range in about two hours, while light equivalent to 60 suns did the job within 15 seconds. Scientists used two different setups: sunlight focused on a long glass tube and on a man-made waterfall. Next, the lab, working in cooperation with the Solar Energy Research Institute (Golden, CO), will test the process on trichloroethylene and dyes.

DEGRADABLE CARRIER FOR PESTICIDES

A biodegradable granular material that can be used as a carrier for pesticides has been introduced by Edward Lowe Industries (Cassopolis, MI), a producer of clay carriers. The inert cellulose-based Biodac product is "virtually dust free, eliminating the concern of airborne dust bearing toxic chemicals." It can take up so and liquid pesticides, and si density, and pH can be tailored customer specifications. Ot applications include animal ph maceuticals.

NOT MUCH LAS GETS AWAY

Linear alkylbenzene sulfona (LAS) has been used as a surfa tant in detergents for more th 25 years. Now it's been four that 98%-99% of the LAS prese in wastewater is removed throug biodegradation in sewers ar treatment at sewage plants, acco ding to Jose L. Berna of Petr quimica Espanola (Madrid), wh recently presented results of study sponsored by the Europea Centre of Studies on LAB (linea alkylbenzene). Any LAS that get out in the effluent is adsorbed or to sludges, where it degrades fur ther. Berna said the half-life fo LAS in streams is one to tw hours.

A GENE FOR HERBICIDE TOLERANCE

Calgene (Davis, CA) reports that a new patent — U.S. 4,816,-648 — has been assigned to its partner, Rhone-Poulenc Agrochimie, for a gene that gives plants tolerance to the French firm's broadleaf bromoxynil herbicide. Calgene says the gene enables a plant to produce an enzyme that detoxifies the herbicide. Rober Salquist, Calgene's president and CEO, says the gene will first show up commercially in cotton. Bromoxynil is already "widely used," but until now couldn't be applied to broadleaf crops, such as cotton. Thus engineering tolerance to the herbicide should "open up a new multimillion-dollar market," Salquist adds.

News About New Projects.

ET MINISTRIES MERGE, IAN PROJECTS AXED

najor shake up of the Soviet ucracy will lead to the dis- rance of 20 industrial mini- . Announcing the changes Congress of People's Depu- the newly re-elected prime ter Nikolai Ryzhkov said the number of industrial minis- will be reduced from 52 to

zhkov dropped another bomb- by announcing that only two e five massive petrochemical cts planned for Siberia — olsk and Surgut — will now uhead.

the chemical industry, five stries will be streamlined in- ree, the most significant cha- being the merger of parts of ministry of oil refining and ochemicals with that of the micals industry. Observers be- e Nikolai Lemapev, the minis- of oil refining and petrochemi- s, will become the head of the ministry of chemical indus- s. Yuri Bespalov, the present micals minister, is likely to the ministry of foreign affairs. Only the petrochemicals part of former ministry, responsible ethylene, aromatics, rubber, will be hived off to join the w ministry of chemical indus- es. Oil refining will be merged th the ministry of gas.

Other changes affecting the So- et chemical industry involve the esent ministry of fertilizer prod- tion. In a logical and long- erdue move, non-fertilizer acti- ties, such as caprolactam and erhaps methanol, will be comb- ed with the ministry of chemi- al industries. The remaining ac- vities will be withdrawn from the ministerial system and, toge- ther with parts of the now-disb- anded Gosagroprom, will form a new association for fertilizers and agrochemicals producers and us- ers. Nikolai Olshanski, minister of fertilizer production, will be the chairman of the new company.

The pulp and paper industry mi- nistry is not affected by the chan- ges, although Ryzhkov said that the control of timber resources consumption is to be strengthen- ed.

The final reorganization targets the medical and biochemical mi- nistry and/or that of the chemical machinery industry. No details are available at present.

The fate of the ministry of oil production and its head, Vasili Dinkov is unclear at this stage. It is rumoured that the explosion of the LPG pipeline next to the trans-Siberian railway, which cau- sed the death of over 400 people, will lead to Dinkov's early retire- ment.

Ryzhkov's comments about the future of the petrochemical proj- ects in Western Siberia came du- ring his concluding speech to the congress. Replying to questions on the planned gas-chemical com- plex in the Tyumen region, he said, for one, the country cannot do without developing its chemi- cals sector. Secondly, proposals by some scientists to transport hydrocarbons from Siberia for processing in the European parts of the country, should be put to residents of such towns as Volgo- grad, Dzerzhinsk, Gorkii, Ufa, Sterlitamak and others, where there are already environmental problems. If, however, the resid- ents agree to the construction of new, or the expansion of existing enterprises, the prime minister went on to say, he would support the move, which would solve the problem.

The reason why it is necessary to build the complexes in the Tyumen region, Ryzhkov said, is that in the past 20 years huge re- sources have been channelled, in- frastructure and towns built and yet Western Siberia today is still a raw material region, "a raw ma- terial province," without process- ing facilities. This, he said, is not normal, especially in view of the fact that gas produced in the re- gion has a 6 per cent ethane con- tent.

Today some 15 bn cubic metres of gas is wasted in Western Sibe- ria by burning. Around 10m ton of soot is released into the air and some 30bn cubic metres oxy- gen is burned out.

This is the background which led to the planning of enterprises which would process natural gas on the spot. The plan has been developed for the next 15 years. In the next five year plan, how- ever, it is intended to expand the existing complex at Tobolsk and to build a new one in Surgut. This is the maximum the country can afford, Ryzhkov said. The reason for joining forces with fo- reign companies in the projects is that the Soviet Union does not as yet possess environmentally clean technologies.

Ryzhkov pointed out that the Soviet foreign currency debt is now Roubles 34bn ($50.5bn). Of the Roubles 16bn available this year, Roubles 5bn will go on buy- ing grain, Roubles 2.5bn on the purchase of machinery and new technology, Roubles 2.6bn on im- ports of chemicals, Roubles 1.5 bn on products for the light indu- stry and Roubles 2bn on materi- als for the metal industry, leaving Roubles 2.5bn to service the ex isting credits

The prime minister's speech suggests that the remaining three projects — Uvat, Nizhnevartovsk and Novyi Urengoi — have at best been postponed to the 14th five year plan (1996-2000) or abandoned all together.

Even the champion projects at Tobolsk and Surgut have been scaled down and the total investment cost is now put at $10bn, half of which represents the foreign currency portion. The latest reshuffle of the ministries will probably delay the signing with members of the foreign group — Combustion Engineering and Mc Dermott.

Companies involved in the three projects, which have been suspended, will undoubtedly be disappointed. Much money and effort has already been spent on endless discussions and feasibility studies, both in the USSR and outside.

Ryzhkov did not mention the Tenghiz project planned in the Soviet republic of Kazakhstan. This project, however, is of strategic importance to the USSR because it is connected with the country's oil production. The sulphur content of the Tenghiz field is so high that it would be impossible to reinject, burn or pipe the associated gas without prior cleaning. Having installed the equipment to purify the gas the next logical step would be to do something with it.

KUWAIT TO PREQUALIFY FIRMS FOR UNIPOL PP

The Petrochemical Industries Co. (PIC) of Kuwait has invited contractors to prequality for the construction of a new polypropylene (PP) plant. The 80,000 ton/year facility will be built at the Shuaiba industrial complex at a cost of $140m and use Union Carbide's **Unipol** process.

Carbide's PP bidding contractors include Toyo Engineering, Linde, John Brown, Mitsubishi Heavy Industries and IHI. These companies can make fixed-price bids in a relatively short time frame. However, after signing a **Unipol** licence, the client is free to select any contractor. Those wishing to participate should be local entities or have a local partner or agent registered with the commerce & industry ministry and the Kuwaiti chamber of commerce & industry. Closing date is 29th July.

The project forms part of a larger investment programme which also includes a 50,000 ton/year MTBE and an alkylation plant at the Mina al-Ahmadi refinery. France's IFP is supplying technology for the MTBE plant and Stratco of the US for the alkylation facility.

BADGER FOR HYUNDAI EB/STYRENE PLANT

Badger Engineers, a Raytheon company, has been selected by Hyundai Petrochemical Co. to provide a basic process package, procurement assistance, engineering advisory services and start up assistance for an ethylbenzene/styrene monomer plant to be located in Daesan, Korea. The plant will produce 100,000 ton/year of styrene monomer and is expected to start up in late 1990.

The Mobil/Badger vapour-phase alkylation process will be used to produce ethylbenzene which will then be dehydrogenated to styrene by way of the Fina/Badger styrene process.

JAPAN IN NEED OF ONLY ONE MORE CRACKER

A report just submitted to Miti by the council of industrial structure of Japan concluc 400,000 ton/year of new capacity will be needed b

This suggests that t room for only one new cr Japan by that time. The entitled Petrochemical Ind Japan in the 1990s, say ethylene demand in the will grow by 3-4 per c from now to the year 20 ching 6.3m ton in 1995 ar ton in 2000.

A programme of debott ing will bring capacity to mum of 6.2m ton/year by By 1995 this should rise t ton/year and assuming the work at 90 per cent of c production in 1995 is lik reach 5.9m ton leaving a 400,000 ton/year.

These figures, the repor can be influenced by change under way in the petroch sector of the countries of t East — Korea, Japan and C

They should, however, p a base for discussions. Six crackers have been propose only one or two are likely ahead. Of the six, the China 600,000 ton/year industry er planned by Maruzen Petr mical, Sumitomo Chemicals, sui Petrochemical, Idemitsu chemical and Nippon Petroc cal is the furthest along. A gh its environmental asses has not yet been completed, downstream plant configurati nearly finished.

The second most adva plant is a 600-700,000 ton cracker planned by Mitsubish trochemical at Kashima. The pany has completed the env mental assessment study but not yet found joint venture ners.

Total ethylene capacity in Japan

	000 ton
987	4,332
t 1988	5,060
	(— skipping repairs — 5,300-5,550)
	(+ skipping repairs — 5,700-5,800)
	(+ skipping repairs — 6,300)

Ethylene plants planned in Japan

pany	Location	Capacity 000 ton/year	Completion
ubishi Petrochemical	Kashima	600-700	1992/93
va Denko	Oita	(x) to 800	1991
Industries/Mitsui	Ube	500	1992/93
emical/Mitsui			
trochemical Nihon			
okubai/Tokuyama Soda/			
anegafuchi Chemical			
uzen Petrochemical/	Chiba		1992/93
umitomo Chemical/			
litsui			
etrochemical/Idemitsu			
etrochemical/Nippon			
etrochemical			
oh (Shindaikyowa	Yokkaichi	300-500	1992/93
etrochemical)			
hi Chemical	Mizushima	500	?

ONE & WEBSTER WINS BP ANGEMOUTH CRACKER

Stone & Webster (S&W) has n the contract to expand BP emicals' ethylene cracker at angemouth in Scotland. Won ainst intense competition, hich was eventually narrowed wn to two contractors — itself d MW Kellogg, the award cov- s process design work on a pro- amme to double existing capa- ty from 270,000 to 540,000 n/year (a maximum of 300,000 n/year could be added).

S&W was selected to prepare he plant specification for the new facilities after an extensive review and evaluation of the available technologies. Using light hydrocarbon feedstock, including LPG and ethane, the plant will employ the S&W **M** coil furnace design; a design with many years of proven operating experience featuring high selectivity, high capacity and long run lengths when cracking light feedstocks. The planned unit will make products at low manufacturing cost consistent with a high degree of flexibility, case of operation and long-term reliability.

The existing facility at Grangemouth, supplied by S&W in 1968, is designed to crack naphtha or ethane. Idled back-end capacity allows for fairly easy investment to maximize output possibilities.

The project, which is likely to cost £200m ($304m), is expected to receive board approval sometime this year. Completion is scheduled for the last quarter of 1992.

BP, Europe's second largest producer of polyethylene, does not produce enough ethylene to feed its PE plants. This year, the company confirmed, purchases of ethylene will be around the 100,000 ton mark.

Its total European ethylene capacity is currently put at 750,000 ton/year while consumption is already approaching 900,000 ton/year. In addition, PE expansion plans now under way will require an extra 150,000 ton/year for an hdPE plant at Grangemouth plus another 30,000 ton/year at the same site to cover requirements associated with the construction of an lldPE unit (some PE capacity is being taken out) as well as an extra 15,000 ton/year at Wilton where the company is debottlenecking a plant. By 1992 its ethylene deficit will reach 250,000 ton/year.

"BP Chemicals is committed to sell propylene to its long-term customers," declared a company spokesman. BP uses some propylene in its acrylonitrile plant at Grangemouth and sells the rest on the market. The new facilities will give it around 80,000 ton/year of extra propylene, which it could use in its previously announced 200,000 ton/year acrylonitrile plant in Europe. This facility, which according to previous statements will be a coastal facility (Grangemouth, Antwerp?), will require a total of 230,000 ton/year of the feedstock.

Grangemouth is one of two major cracker expansion projects in the UK. Exxon/Shell are spending £130-200m on a project to raise ethylene capacity at Mossmorran by 250,000 from 650,000 ton/year and are installing a 180,000 ton/year polymer-grade propylene facility.

In addition, ICI is considering restarting a 450,000 ton/year idled cracker at Wilton, provided it finds a joint venture partner, which would be interested in the ethylene. Generally balanced in ethylene, ICI is a major purchaser of propylene.

S&W is continuing development work into its **Quick Contact** olefins technology. The process, described as a "quantum leap" in olefins technology, is in commercial development on an unidentified plant in Europe. It aims to give a very flexible design capable of handling any feedstock.

ROVIN EXPANDS PVC CAPACITY

Rovin, the 50-50 joint venture between Akzo Salt & Basic Chemicals and Shell Nederland Chemie, is the latest PVC producer to announce a capacity expansion.

The company is investing Dfl. 280m ($123m) on a project to replace the reaction sections of its two existing plants with a new, righer capacity polymerization unit based on technology supplied by Shinetsu of Japan. The finishing line, which was initially designed for a larger capacity, will not need to be expanded.

On completion at the end of 1991, the new plant will produce 295,000 ton/year of suspension-grade PVC compared with present 215,000 ton/year capacity.

The investment will rank Rovin as Europe's seventh largest producer of PVC after EVC, Solvay, Atoochem, LVM, Hydro and Huls. Flour has won the contract to build the new plant.

Located on Shell's site at Pernis, the Rovin PVC facility gets its VCM feed from the joint venture's plant at Botlek, some 7km west of Pernis.

Formed in 1982, through the merger of Akzo's VCM and Shell's PVC operations, Rovin today makes some 520,000 ton/year of VCM and is the largest merchant producer of the monomer in Europe.

Peter Weishut, managing director of Rovin, foresees the PVC market growing at a modest 2 per cent/year in the next few years. Output from the plant is sold on the Benelux, German and UK markets.

DOW CONFIRMS U.S. STYRENE FACILITY

Dow Chemical has again confirmed its intention to build a new styrene monomer plant in the U.S. Supporting its view that the outlook for polystyrene, ABS, latex and other styrene derivative businesses in the 1990s is a continuation of the growth experienced in the late 1980s, Dow is planning a new styrene plant, most likely to be constructed on the US Gulf Coast.

Announcing these plans, Bill Waycaster, vice president and general manager for hydrocarbons and energy, Houston, said "This plant, to yield one billion pounds (454,000 ton/year) of styrene, will support the internal derivative growth for Dow Chemical on both a U.S. and global basis".

Dow Chemical is the worldwide leader in styrene production and consumption, representing 11 per cent of the industry's capacity. According to Waycaster, the new plant will incorporate in its design significant advanc has made in ethylbenze styrene technology.

The styrene produced facility will be used to sa isting Dow demand, in pa placing existing capacity with the additional capaci sult from this expansion, pected that Dow will rema buyer of styrene monome global system. The plant to the board of directors' f proval, will come on line 1993 time frame.

In Europe, Dow is unde a major styrene expansion ramme at Terneuzen.

This expansion will rais city from 755,000 ton/y 975,000 ton/year by 1990 ageing units will be subs by a new 450,000 ton/year ty. The third more recent being expanded from 4 ton/year to 525,000 ton/ye

SHELL WINS YANPET EO STUDY CONTRACT

Shell has won a study co for a new ethylene oxide plant planned by Yanpet, th bic-Mobil joint venture base Yanbu, Saudi Arabia.

The plan, referred to as Y 2, involves the construction cilities for 200,000 ton/ye monoethylene glycol downst from a new Kellogg-pro 500,000 ton/year naphtha cra

Under the terms of the Shell will carry out the engi ing study and the final dec on technology selection wil made after the capital cost mates and other operating fac are evaluated by Fluor, consu to Yanpet 2. Yanpet will then cide which of the two techno es on offer — Shell or Scien Design — will be selected.

NEWS FROM JAPAN

aysia to Build 300,000-t/y ylene Plant by 1995

ctronas — Malaysia's national company — is scheduled to d a 300,000-t/y ethylene plant 1995, but will probably do so or two years earlier in reality. country is blessed with natu- gas, which will be fed into the plant.

Big businesses overseas have pressed their intention of join- the petrochemical project: y are Exxon Chemical (U.S.), Chemical (U.K.), Neste (Fin- d), Idemitsu Petrochemical and tsui & Co. (both Japan). There a possibility that many more reign companies will participate it.

Petronas — together with Neste d Idemitsu Petrochemical — s already worked out a plan to oduce polypropylene and meth- tertiary butyl ether (MTBE) m natural gas. In addition, the alaysian company is planning to oduce polyolefin and polyvinyl loride from ethylene.

It is forecast that the planned hylene venture based on natural as will gain an advantage over hylene-based ones — which are eing worked out in other Asian ountries including Japan — in rms of production cost from a ng-term point of view.

Petrochemical demand in outheast Asia is estimated to how double-digit growth and S. Korea and Taiwan are moving to- ard building or scaling up their thylene plants. It will be inter- sting to see how Thailand, Indonesia and Malaysia will push forward their ethylene ventures. Thailand is already implementing a phase-I ethylene project.

Start-up of Mitsui's Large Phenol Plant Slated for 1991

Mitsui Petrochemical Industries Ltd. plans to build 200,000-t/y phenol plant at its Chiba factory with start-up scheduled for October, 1991. Related construction will be inaugurated this fall. The company will simultaneously erect a 70,000-t/y aniline plant at the same factory.

An inhouse-developed production method designed not to by-produce acetone will be employed for the new phenol plant. The company has applied for patents on the new process both at home and overseas.

In conventional methods, phenol and acetone are simultaneously produced at the rate of 1:0.6. To date new phenol ventures have always called for disposal of by-product acetone. Development of the nonacetone process has provided the technical background for construction of the said plant.

Mitsui Petrochemical will use by itself 150,000 tons of the 200,000 tons of phenol produced by the new plant annually: 50,000 tons will be applied to bisphenol-A production, 70,000 tons to aniline production and the balance to production of derivatives including 2,6-xylenol. The company claims construction of the new plant will not exert a deep influence on the domestic phenol market.

Japanese demand for phenol in fiscal 1989 is projected to reach 420,000 tons, whereas her combined production capacity will amount to roughly 430,000 tons since three domestic makers are scaling up their plants. The product will be in tight supply in the not-distant future in response to growing demand for use in bisphenol-A and aniline production.

A few phenol makers in Japan, the States and Europe are scheduled to scale up their phenol production by more than 100,000 tons a year in each case but implementation of the projects concerned has been postponed due to problems related to sharing of the necessary investment funds.

Fused Phosphate Capacity of 200,000 t/y to be scrapped

It seems likely that the Japanese fertilizer industry will reach a settlement within July on disposal of excessive production capacity for fused phosphate — a long-pending issue — under the support of The Law on Temporary Measures to Facilitate Industry Structural adjustment.

There are eight fused-phosphate makers in Japan and they are expected to cut back their production capacity by around 200,000 t/y in total, or about 40% of the total current capacity of 530,000 t/y. It is estimated that this will lead some makers, particularly those with smaller production capacities, to completely retreat from fused-phosphate business.

The domestic market for chemical fertilizers has been squeezed seriously due to increased imports of farm products and rice-acreage reduction as well as increased imports of fertilizers from South Korea, etc. Since 1983 Ja-

pan's fertilizer industry has voluntarily scrapped production capacity under the temporary measures law, including that of fused phosphate which had been cut back by about 210,000 t/y by the end of 1988, but still leaving a gap of about 220,000 t/y between actual demand and production capacity.

Two Mitsui Firms Back Up Thai Polystyrene Maker

It was recently announced that Mitsui & Co. and Mitsui Toatsu Chemicals, Inc. have invested in Eternal plastics — a Thai polystyrene maker — and Mitsui Toatsu has given technical support to the Thai company with regard to construction of the latter's 12,000-t/y polystyrene plant.

As a result, the Thai firm is owned 65% by Eternal Resin (Thailand) and 35% by three Mitsui group companies including the above mentioned two.

The polystyrene plant is now under construction and will come on stream shortly. It will produce HI-grade products as well as GP-grade ones. Mitsui Toatsu's technical support is aimed at helping the Thai maker produce HI-grade products capable of satisfying user needs for high-quality products. Mitsui & Co. will address itself to exports of the products.

The two Japanese companies' moves are intended to supply the synthetic resin to Japanese corporations who have inaugurated production activities in Thailand and Malaysia, etc.

Eternal Resin already has a 15,000-t/y plant for GP-grade polystyrene. The company and Mitsui & Co. previously jointly applied to the Thai Board of Investment for approval of their styrene-monomer venture.

In Thailand, polystyrene ventures are being aggressively pushed forward in response to rapid market growth involving automobiles, household electrical appliances and sundries. Srithepthai Plaschem — in which Sumitomo Corp. has invested — has built a new 10,000-t/y polystyrene plant. Thai Petrochemical Industry and an international consortium comprising Thai Toa (Thailand), Huntsman Chemical (US) and Mitsubishi Corp. (Japan) are scheduled to erect a 30,000-t/y plant and a 25,000-t/y plant, respectively.

Toray's U.S. Subsidiary To Export Polyester Film base

Toray Plastic America (US) plans to export polyester film base for magnetic tape to Europe and Japan after 1991. To this end, the company is building an 8,000-t/y polyester film plant in Colorado, the United States.

The U.S. company can be traced back to Trea Industries, Inc, a U.S. maker of biaxially oriented polypropylene film which Toray Industries, Inc. took over in 1985.

Toray Industries has hitherto exported several thousand tons a year of polyester film to Europe. The planned venture by the US subsidiary is aimed at eliminating unprofitable exports resulting from the increase in the yen's value.

The Japanese company is reckoned to export 6-8,000 tons a year of polyester film to the States. The new company will be able to supply a corresponding amount of product. It is considering scaling up production capacity for the new plant to 25,000 tons some time in the future.

Toray Industries intends new outlets for polyester food packaging fields in Ja date the company has s the product for use in the facture of magnetic tape, tors and other industr items. It is Japan's larges ester-film maker with a cor production capacity of 6,80 a year.

Japanese demand for the duct is steadily increasing, t the profitability involved ha lined along with the falling keting prices for video tape major outlet for polyester f

Hitachi Metals Invests in U.S. Optical Microwave Par Firm

Hitachi Metals Ltd. has c out capital investment in D nic Crystal Industries, Inc. c US, a venture business for o and microwave parts.

The capital participation help both companies promot provement and development regard to technology for materials for the said parts, as yttrium-iron-garnet and lit niobate alloys. Under the a ment the Japanese firm will in July its technical experts t US firm to prepare for various tivities including installation single-crystal production pot

OWENS CORNING

Fibreglas, a subsidiary of ens Corning, has completed a m expansion at its fibre glass in Rio Claro, Sao Paulo state, zil. Capacity at the unit has b lifted from 20,000 ton/year 36,000 ton/year. Fibreglas is rently Brazil's sole produce the product.

New Developments from Japan

tomo Makes High -Resistant Polyimide Resin

umitomo Chemical Co. has loped "Bestlex SM-20" heat- tant polyimide resin — ter- l amine-type imide oligomer otential applications are heat- tant laminates, IC-packaging erial, adhesives and moulding erial, etc.

When combined with epoxy re- it shows high-level thermal re- ance and adhesiveness: it cu- quickly and attains a high s-transition temperature of)-220 deg. C. In addition, it has excellent dimensional bility, insulation properties and istance against soldering heat.

When the new product is trans- med into glass fiber-reinforced oxy-modified imide resin, the ultant product's main proper- s are: glass-transition tempera- e, 216 deg. C; coefficient of bical expansion. 1.18; volume sistivity, 6-10^{16}; peeling resist- ce (when copper is laminated ereupon) 230 kg/m; resistance ainst soldering temperature, er 5 minutes; and tensile shear ength (when product is used r bonding soft steel plates), 0 kg/cm2.

There is growing demand for w material having dimensional/ ermal stability, keeping pace ith commercialization of highly tegrated electronics devices nd a wide variety of printed cir- uit boards — whose users call or high reliability with regard to e through holes formed there- pon. Sumitomo Chemical claims he new product is able to satisfy such demands.

The company envisions diversifying into thermosetting-polyimide operations based on "Bestlex Series" products.

Phase-III Toxicity Tests Planned On 2 CFC Substitutes

The world's seven CFC makers have worked out a 3rd-phase co-operative test project (PAFT-III) aimed at hydrogenated CFC (HCFC) 124 and hydrogenated fluorocarbon (HFC) 125, which are believed to be suitable for replacing CFC 114 and 115, respectively. The latter two are used as coolants and blowing agents for synthetic resin in each case.

The seven are Daikin Industries of Japan, Du Pont and Allied-Signal of the U.S., ICI and ISC of the U.K., and Atochem and Montefluos of Italy. They are scheduled to inaugurate this November 5-year tests on acute, chronic, hereditary, environmental toxicity of the said CFC substitutes.

Necessary funds are estimated to reach roughly eight million dollars, which will be shared by the seven.

Fourteen and ten CFC makers spreading throughout the world have been implementing similar co-operative test programs — dubbed PAFT I and II — since January and September last year, respectively. The two programs effective for seven and five years, respectively — cover HCFC 123/HFC 134a — replacements for CFC 11 and 12 — and CFC 141b regarded as a substitute for CFC 11, respectively.

CFC 11, 12, 113, 114 and 115 are believed to deplete the ozone layer and an international agreement has been reached with regard to reducing their production/consumption to half the 1986 levels by 1988.

The said three programs are aimed at co-operative toxicity tests for the four CFC products.

Sumitomo Bares Epoxy Resin Tolerating Heat of 260 deg. C

Sumitomo Chemical Co. has developed a trifunctional amino-epoxy resin (trade name: Sumi-Epoxy ELM100) having high thermal resistance equivalent to a glass transition temperature of 260°C.

The new product will be utilized as matrix resin for heat-resistant composites (carbon fiber-reinforced plastics). It has high-level adhesiveness, strength and thermal resistance when exposed elasticity as well as outstanding to high levels of heat and humidity.

A potential application of the new product is, for example, advanced composite for aircraft-use structural material, which needs to have excellent high-temperature hygroscopic properties.

The company envisions building up business operations involved with epoxy resins for heat-resistant composites.

New Evaluation System For Super Ultrapure Water Will Appear

Japan Organo Co. is hurrping to commercialize an evaluation system for super ultrapure water to be used in the manufacture of highly integrated semiconductors.

Requirements for such evaluation systems have been increasing in Japan with ever-advancing integration of semiconductor chips. Instead of conventional systems to examine pure water by

item — in terms of number of particles. TOC (total organic content) and silica content, etc., the new system now under developfent measures the purity of a given volume of water by means of picture analysis of the residue remaining after the water has evaporated.

The company says the new system makes it possible to examine water purity in the unit of ppt (particles per trillion) — the degree of purity that has come to be required for highly sophisticated chip manufacture.

The company is now gearing up efforts to develop the system in a 1d0-m2 clean room at its Toda research laboratories. The method utilized is that of observing a "water mark" (spot produced after evaporation of water) under a microscope and analyzing it using a computer. "The system is now 80% complete," a company official says.

New Enzyme Sensor with Silk Fibroin Membrane Developed

A group of researchers led by Tetsuo Asakura of Tokyo University of Agriculture and Technology have developed an enzyme sensor utilizing the membrane-potential response characteristic of silk fibroin — a protein forming Membrane potential is the potential difference produced between the main ingredient of raw silk different electrolytes separated by a membrane.

The enzyme sensor is designed to determine the membrane potential produced in conjunction with an intramembranous enzymatic response utilizing the characteristic charge density which is largely dependent on the pH of the environment.

The researchers have produced a membrane by mixing silk fibroin solution with enzyme glucose oxidase and casting it. By immobilizing the enzyme, they have also produced the substance in the form of powder and fibre in addition to membrane.

Adjustable Component-ratio Copolymers Made Using Microbe

A group of researchers at Research Laboratory of Resources Utilization, Tokyo Institute of Technology have succeeded in having a specific microbe synthesize polyester copolymers, for which the component ratios can be controlled to a certain extent by adjusting the contents of the culture medium involved.

This means that the properties of the copolymers in question — biodegrability, and hydrolytic property etc. — can be adjusted to some degree.

It has been known that many microbes synthesize optically active polyester (poly-3-hydroxybutyrate: P(3HB) and this polyester excels in biodegradability, hydrolytic property and bioadaptability, etc. It is, for instance, taken in by microbes in the soil and is finally decomposed into simple substances such as carbon dioxide.

The group cultivated Alcaligenes eutrophus as a host microbe using butyric acid and valeric acid as culture medium so that the microbe could produce a copolymer of P(3HB) and 3-hydroxyvalerate (3HV). The researchers succeeded in adjusting the ratio of the copolymer components to 95% P(3HB) and 5% 3HV, respectively, by arranging the shares of contents of the culture medi For a copolymer of P(3HB) 4-hydroxybutyrate, it is poss to raise the share of the P(3 component 4-hydroxybutyrate is possible to raise the share the P(3HB) component to aro 50%.

As regards the hydrolytic perty of the copolymers obtai by the said method, a copoly with a 16%. 4HB content pro to have the highest hydro speed in the case of using the polymer made into a film by c ing, followed by that with a 4HP content and a 68&-3-HB tent.

For biodegradability, a 17-copolymer was completely compored in 18 hours — the test among all samples. In a tion, 3 3HV copolymer was fastest thermal decomposition

C. Itoh to Tie Up with Italian Apparel Company

C. Itoh & Co. said it will se a joint venture in July with G po GFT, Italy's largest ap maker.

GFT Japan Co., capitalized 40% by the major Japanese t ing firm and 60% by Gruppo G will deal in imported clothes er the Gruppo brand. An sales of Y10-15 billion are ex ted in five years, accordin C. Itoh.

Gruppo GFT, well-known breeding such top designers Georgio Armani, has an enorm marketing network in Europe the US. and for fiscal 1988 e March 31 registered consolid sales of Y121.2 billion.

MARKET INFORMATION

crylamide, Titanium Dioxide Up

rt supplies pushed up prices of mide by Rs. 5 to Rs. 90 per kg tanium dioxide by Rs. 5 to 30 per kg. Due to the transport free flow of material has been ed. The impact on prices is expected to be varied with outstation material unable to come in and local markets being stuck. Methanol went up by Rs. 2.50 to Rs. 12 following lack of materials. Dyes remained stable.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent – and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on August 1, 1989)

TRIAL CHEMICALS	Per Kg.
nium sulphate	2.50
nium phosphate (Mono)	14.50
nium phosphate (Di)	14.00
nium carbonate (Di)	17.00
nium bicarbonate	5.60
nium chloride	3.00
nium nitrate	6.00
ic white powder	24.00
amide (Resale)	90.00
m carbonate	6.00
hing powder (33% Cl)	4.20
Borax (Granular)	15.00
Borax (Powder)	15.25
Boric acid (Tech)	28.00
Bisphenol-A	82.00
Butyl carbitol	110.00
Caustic soda (Flakes)	14.00
Caustic soda (Solid)	12.00
Caustic soda (Lye)	10.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	280.00
Cresylic acid	52.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.) China	70.00
Citric acid (Belgium) (Resale)	47.00
Citric acid (Indian) (Resale)	47.00
Copper sulphate	24.00
Chromic acid	61.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	115.00
Hydro	38+ST

Hyflosupercell	17.00
Hexamine (Resale)	35.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	31.25
Lithopone	18.50+ST
Magnesium chloride (Crystal)	1.25+ST
Menthol crystal (Flakes)	900+Ex+ST
Menthol bold	665+Ex+ST
Menthol crystal cold	700+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate-(Indian)	18.00
Maleic Anhydride (Resale)	39.00
Mercury (34.5 Kgs)	12,000.00
Nickel chloride	110.00
Oxalic acid (Resale)	22.00
Peppermint oil (Rectified)	195+Ex+ST
Potassium carbonate (Indian)	30.00
Potassium carbonate (Imported)	32.00
Potassium bichromate	32.50+ST
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	105.00
Polyvinyl alcohol (No. 173)	120.00
Polyvinyl alcohol (No. 208)	150.00
Paraformaldehyde (Resale)	23+ST
Phthalic anhydride 36% (Resale)	27.50
Pentaerythritol (Resale)	45.00
Paraffin wax	20+ST
Rangolite (German)	80+ST
Rangolite (Czech.)	61+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	680.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	5.00
Soda Ash (Birla)	4.50
Soda Ash (Imp.)	4.50
Sodium bicarbonate	7.50
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	5.00
Sodium alginate	250+ST
Titanium Dioxide (Anatase)	130+ST
Titanium Dioxide (Rutile – RCR_2)	140.00
Tartaric acid	100.00
Trisodium phosphate	5.50
Thiourea	80.00
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	52.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate.	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.50
Acetic Anhydride (Resale)	31.00
Acetone (Resale)	16.50
Adipic Acid	57.00
Aceto Acetanilide	55.00
Aniline Oil	68.00
Benzoate Plasticiser	62.00
Butyl acrylate	78+ST
Butyl stearate	50.00
Butanol	
Benzyl Alcohol	
Benzyl Chloride	
Benzo trichloride	
Benzoyl chloride	
Bromine Liquid	
Chloroform	
Carbon Tetrachloride	
Cellosolve	
Cyclohexanone	
Cyclohexanol	
Diacetone (Resale)	
Diethyl Oxalate	
Diethyl glycol (DEG)	
Dioctyl Phthalate	
Diallyl Phthalate	
Dimethyl Phthalate	
Dioctyl Adipate	
Dibutyl Adipate	
Dipentene	
Dimethylamine 40%	
Dimethylamine 50%	
Ethyl Acetate	
Ethyl Acrylate	
Ethylene Dichloride	
Ethylene Glycol	
Formic Acid (Imp.)	
Formaldehyde (Resale)	
Glycerine (CP)	
Glycerine (IW)	
Hydrogen Peroxide 50% (Resale)	
Isopropyl Alcohol	
Isobutyl Alcohol (Resale)	
Monoethanolamine (Resale)	
Melamine	
Methyl Ethyl Ketone	
Methyl Isobutyl Ketone	
Methyl Acrylate	
Methyl Dichloride (Resale)	

Carbitol	68+ST
Meta Cresol	60.00
Nitrobenzene	30.50
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	37.00
Propylene Glycol	55.00
Polyethylene Glycol (No.200)	52.00
Polyethylene Glycol (No.400)	53.00
Polyethylene Glycol (No.500)	42.00
Polyethylene Glycol (No.1600)	14.00
Polyethylene Glycol (No.4000)	70.00
Polyethylene Glycol (No.6000)	85.00
Para Cresol	110.00
Styrene Monomer	36.00
Sorbitol	14.00
Sulphuric Acid	2.80
Trichloroethylene	29.00
Triethanolamine (Resale)	65.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	47.50

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.00
Methanol	9.50
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	21.00
Xylene	24.50

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)	
Alphanaphthylamine	63.00
Alpha Naphthol (Imp.)	190.00
Aceto Acetic Ester (Methyl)	66.00
Ammonium Molybdate	215.00
Anthraquinone	130.00
Anthranilic Acid	75.00
2-Amino 4-Nitrophenol	150.00
Blue B. Base (Local)	255.00
Beta Naphthol (Atul)	75.00
Benzidine Dihydrochloride (BDH)	98.00
Bromamine Acid	500.00
BON Acid	130+Ex+Ta
Chicago Acid IRS	330.00
Coach Acid	55.00
C. Acid (Imp.)	165.00
Cyanuric Chloride	135.00
2,4- DNCB	31.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	70.00
Diethyl Aniline	185.00
Diamino stilbene disulphonic acid	165.00
3,3-DCB (Imp.)	175.00
Gamma Acid (Atul)	200.00
H. Acid (Atul)	110.00
G. Salt	75.00
Isophthalic Acid	45.00
J. Acid	330.00
J. Acid Urea	400.00
K. Acid	127.00
MPDS (German)	190.00
MNA	12
Meta Ureido Aniline	23
MPD (Local)	21
MPD (Japan)	25
Naphthenic Acid	4
N-Methyl J. Acid	54
N-Methyl Aniline	13
Naphthalene (Refined)	2
Ortho Anisidine (OA) (Imp.)	10
Ortho Dichloro Benzene (ODCB)	1
OT Base	11
Para Dichloro Benzene (PDCB)	2
Para Anisidine (PA local)	15
PNA	10
Para Cresidine (Imp.)	40
Para Amino Azo Benzene (India)	19
PNCB	4
Para Amino Acetanilide	17
1-Phenyl 3-Methyl 5-Pyrazolone	15
Phenyl J. Acid	37
Para Amino Benzoic Acid	13
PT Base	16
Rhoduline Acid	53
Resist Salt 80%	3
Resorcinol	19
Sodium Naphthionate	6
5-Sulpho-Anthranilic Acid	8
Sulphanilic Acid	5
Sulpho Tobias Acid	16
Trichloro Benzene (TCB)	2
Tobias Acid	17
Metanilic Acid	4
MTD	11

Bombay Dyes Market

(Prices as on August 1, 1989)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc	249 20
Cotton Red N	117.05
Brill. Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531 95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813 20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320 80
Pink REL	593.00
Red BEL	615 60
Red 2B	42
Red FB	42
Red Violet FBL	62
Orange 3R	25
Violet 3R	37
Violet RL	35
Violet 6R	63
Scarlet RR	28
Rubine 3B	28
Rubine CB	44
Blue GL	41
Blue BGF	80
Navy Blue RE	35
Brown 3REL	27
Black GEL	42
Dark Brown 3B	41

BASE COLOURS	Per
Fast Yellow GC	7
Fast Orange GC	12
Fast Scarlet R	19
Fast Scarlet RC	12
Fast Scarlet RCR	10
Fast Scarlet G	11
Fast Scarlet GN	9
Fast Scarlet GG	7
Fast Scarlet GGS	7
Fast Red B	23
Fast Red RC	11
Fast Red R Flakes	15
Fast Red TR	18
Fast Red TR Oil	22
Fast Red RL	25
Fast Red KB Oil	25
Fast Bordeaux GP	23
Fast Garnet GBC	10
Fast Violet B	54
Fast Blue BB	56

NAPHTHOL COLOURS	Per
ASG	30
AS	20
ASSW	37
ASBS	25
ASBO	26
ASD	20
ASOL	24

	369.00
	336.05
	236.00
	249.95
	2002.35
T	2459.45
G	143.00
G	538.65
R	652.60

CION COLOURS	Per Kg.
len Yellow HR	207.95
Yellow H4G	145.65
ra Yellow H-8GP	168.55
Yellow HE6G	214.75
ow G-E4R	276.05
Yellow H7G	332.30
ow M4R	275.45
ow MGR	387.65
Yellow M4G	201.15
Yellow M8G	366.10
ow M3R	244.70
l. Orange H2R	303.80
l. Red H7B	157.95
l. Orange M2R	313.15
l. Red H8B	213.55
l. Scarlet H RN	245.05
pra Red H-3BP	179.80
l. Red H-F3B	243.45
l. Magenta HB	182.00
l. Red M 5B	160.05
l. Red M 8B	218.35
l. Pink MB	137.10
l. Magenta MB	163.65
l. Purple H-3R	219.55
l. Purple H-7R	175.40
avy Blue H 3R	333.75
l. Blue H-GR	406.40
l. Blue H5G	207.95
ue H 5RX	286.20
l. Blue H 7G	213.95
l. Blue H 7RX	358.15
urquoise HA	265.05
upra Blue H-3RP	595.30
upra Turquoise H 2G P	181.50

Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05

Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.00
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: JULY 28, (NNS) Potassium permanganate suffered a sharp fall of Rs. 1,100 at Rs. 3,800 per 50 kg in the Delhi chemicals market during last week on account of easy offerings and fall in demand by local and outside consumers, says NNS. Similarly, zinc oxide nosedived by Rs. 2,000 at Rs. 42,000/52,000 per tonne in the absence of demand due to rainy weather.

Chatkolite China eased by Re. 1 at Rs. 61 due to poor seasonal demand by gur khandsari manufacturers. Sufolite reacted downward by 50 paise at Rs. 64.50 while rangolite Germany looked up by Rs. 2 at Rs. 76 per kg in the absence of fresh import from Germany as well as negligible stock position in the market.

Camphor powder jumped up by Rs. 5 at Rs. 107 owing to brisk and bulk purchases made by the traders of Northern and Southern India. Camphor powder also followed suit and quoted higher by Rs. 2 at Rs. 166 per kg. On account of increased arrivals from U.P. and fall in demand by stockists, menthol flake, medium and bold slipped by Rs. 3/10 at Rs. 247, Rs. 310 and Rs. 340 per kg respectively. Menthol flake July delivery was transacted at the rate of Rs. 248 against Rs. 253 per kg. On account of good demand shown by stockists and fall in arrival, Mentha oil Shivalik and MS 1 hardened by Rs. 9 each at Rs. 185 and Rs. 195 per kg respectively. DMO held steady at the previous closing of Rs. 100.

Ammonia Bi-carb advanced by Rs. 5 at Rs. 150 per 25 kg on heavy demand from Calcutta as well as by local bakeries along with dwindling supply by mills. Caustic soda flakes edged up by Rs. 5 at Rs. 580/585 per 50 kg due to fall in arrivals caused by heavy rains and severe floods in many States. In the wake of brisk purchases from Punjab, paraffin wax jumped up again by Rs. 20 at Rs. 810. Acid slurry hard, went up by Rs. 2 at Rs. 34 on demand by detergent powder manufacturers. Prices of titanium dioxide anatase and RC-822 were quoted at Rs. 123 and Rs. 150 due to speculative activities. No change was recorded in dyes and colours in thin trading.

(DELHI MARKET RATES AS ON JULY 28, 1989)

Ammonia Bicarb (Per 25 Kg.)	150.00
Mercury (Per flask)	11,600.00
Soda ash (Per bag)	330/345.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	580/585.00
Citric acid (Per 50 Kg.)	2,200/2,550.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	100.00
Stable Bleaching Powder KCI (Per 25 Kg.)	95.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	98.00
Sodium Bicarbonate (50 Kg.)	290/300.00
Sodium Hydrosulphite (Per Kg.)	35.00/37.00
Rangolite (Per Kg.)	61.00/76.00
Boric acid Technical (Per 50 Kg.)	1,400.00
Paraffin Wax (Per 50 Kg.)	810.00
Tartaric Acid (Per 50 Kg.)	10,750.00
Borax Granular (Per 50 Kg.)	700.00
Borax Crystal (Per 50 Kg.)	705.00
Sodium Nitrite (Per 50 Kg.)	700/760.00
Sodium Nitrate (Per 50 Kg.)	415.00
Camphor Thal (Per Kg.)	116.00
Camphor Powder (Per Kg.)	107.00
Menthol Bold (Per Kg.)	340.00
Menthol Medium (Per Kg.)	315.00
Menthol Flake (Per Kg.)	24
Glycerine (Per Kg.)	55/5
Sodium Silicate (Per quintal)	250/30
Hexamine (Per Kg.)	3
Acetic Acid Glacial (Per Kg.)	1
Copper Sulphate (Per quintal)	2,350/2
Formic Acid (Per Kg.)	2
Formaldehyde (Per Kg.)	
Hydrogen Peroxide (Per Kg.)	2
Calcium Carbonate (Per Tonne)	2,500/4
Acid Slurry Soft (Per Kg.)	2
Acid Slurry Hard (Per Kg.)	3
Phosphoric Acid (Per 50 Kg.)	1,00
Potassium Nitrate (Per quintal)	900/1,20
Potassium Permanganate (Per 50 Kg.)	3,80
Sodium Bichromate (Per 50 Kg.)	1,575/1,60
Trisodium Phosphate (50 Kg.)	450/45
Titanium Dioxide Anatase (Per Kg.)	12
Titanium Dioxide RC-822 (Per Kg.)	15
Zinc Oxide (Per metric tonne)	42,000/52,000
Phenol Carbolic Acid (Per Kg.)	37
Carbon Tetrachloride (Per Kg.)	24
Chloroform (Per Kg.)	28
Sodium Sulphate (Per metric tonne)	3,200/3,500
Naphthalene Balls (Per 50 Kg.)	1,325

DYES & COLOURS	(Per K
Naphthol AS	175/201
Naphthol ASG	180/295
Naphthol ASBS	210/248
Naphthol ASTR	265/360
Naphthol ASOL	210/238
Naphthol ASBO	195/260

DIRECT DYES	(Per K
Black E. Conc.	110/176
Diazo Black B.T.	105/147
Green B	90/140
Blue 2-B	60/101
Blue 2-B 225% (JNR)	125
Sky Blue FB	160/235
Basic Auramine	55/110
Basic Rhodamine	325/425
Basic Methylene Blue	100/180
Basic Violet	150/180
Basic Malachite Green	150/165
Acid Orange	55/111
Congo Red H/C	75/120

Madras Market

ormal conditions have prevailed ng the week. Inspite of relaxation e power cut, caustic prices re- ned firm at old levels. The torren- ains in Maharashtra and Andhra desh have affected movement of ds from the North temporarily but out much serious fluctuations in e. Supplies of titanium dioxide both anatase and rutile continue to be difficult and the markets for the products are ruling high.

Sodium cyanide prices shot up to Rs. 85 per kg with the reported increase in rates by manufacturers. Degussa material is being quoted at around Rs. 105.

(MADRAS MARKET RATES AS ON JULY 29, 1989)

tic Acid Glacial (per kg)	18.00
minium Sulphate Iron free per MT)	4,000.00
monium Bicarbonate per 25 kgs)	160.00
monium Chloride (per MT)	3,000.00
d Slurry (per kg)	28.00
rium Carbonate (per kg)	6.00
rium Chloride (per kg)	5.25
ric Acid Technical (per kg)	28.00
aching Powder (per 50 kgs)	225.00
rax (per 50 kgs)	700.00
ustic Soda Flakes – Mettur Chemicals (per MT)	12,800.00
ustic Soda Flakes – Andhra Sugars (per MT)	12,800.00
lcium Chloride 70% Solid (per MT)	3,000.00
alcium Chloride Anhydrous (per MT)	5,800.00
alcium Carbonate (Activated) (per MT)	6,000.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	125.00
Pure Para Cresol 96% (per kg)	80.00
Meta Para Cresol 42% (per kg)	48.00
Formic Acid (per kg)	28.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine (per kg)	48.00
Hydrosulphite of Soda (TCPL) (per kg)	42.00
Hydrosulphite of Soda (IDI) (per kg)	44.00
Hydrosulphite of Soda (BASF) (per kg)	44.00
Hexamine (per kg)	30.00
Hyflo Supercell (per kg)	23.50
Hydrogen Peroxide (per kg)	29.50
Litharge (per kg)	40.00
Lead Acetate (per kg)	42.00
Magnesium Carbonate (per kg)	19.50
Magnesium Chloride (per kg)	3.75
Maleic Anhydride (per kg)	43.00
Menthol Crystals (per kg)	300.00
Oxalic Acid (per kg)	25.00
Paraffin Wax (per kg)	19.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	22.00
Polyvinyl Alcohol powder (per kg)	140.00
Pentaerythritol (per kg)	50.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	395.00
Soda Ash (TATA) (per 75 kgs)	395.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,000.00
Sodium Bichromate (per kg)	28.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	12.50
Sodium Bisulphite (per kg)	4.75
Sodium Alginate (per kg)	225.00
Sodium Acetate (per kg)	7.50
Sodium Sulphate (Anhydrous) (per kg)	3.00
Titanium Dioxide (Anatase) (per kg)	135.00
Titanium Dioxide (Rutile) (per kg)	150.00
Trisodium Phosphate (per kg)	7.50
Urea (Technical) (per kg)	3.25
Zinc Oxide (per kg)	54.00
Zinc Chloride Powder (per kg)	14.00
Zinc Sulphate (per kg)	7.00

SOLVENTS

Acetone -- HOCL (per kg)	18.75
Butanol (per kg)	35.50
Butyl Acetate (per kg)	42.00
Benzene (per lit)	17.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	23.00
Chloroform (per kg)	28.50
Diacetone Alcohol (per kg)	29.50
Diethylene Glycol (per kg)	47.00
Dichloroethane (per kg)	17.00
Di-octyl Phthalate (per kg)	50.00
Di-N-butyl Phthalate (per kg)	50.00
Ethyl Acetate (per kg)	21.00
Isopropyl Alcohol (per kg)	30.00
Methanol (per kg)	12.00
Methylene Chloride (per kg)	23.00
Methyl Ethyl Ketone (per kg)	42.00
Methyl Isobutyl Ketone (per kg)	39.50
Phenol (per kg)	38.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	60.00
Trichloroethylene (per kg)	25.00
1-1-1 Trichloroethane (per kg)	27.00
Turpentine (per lit)	17.50
Toluene (per lit)	22.00
Xylene (per lit)	21.00

International Bulk Chemical Prices

Spot Prices are as on July 12, 1989

Naphtha prices have drifted down to $159-163/ton cif NWE. Ethylene prices continue to fall away to $320-330/ton cif NWE. Propylene continued downward trend with a standoff position developing. Butadiene remained tight, with very little prompt material available on the market. Prices shifted upto $ 325-335/ton fob NWE. Benzene firmed to $260-270/ton fob NWE. Toluene prices remained stable at $230-240/ton fob NWE.

Paraxylene ideas have slipped back slightly to $600-605/ton fob following lack of interest.

Orthoxylene prices are stati $300-310/ton fob NWE. Xylenes coming under increased pressure f high stocks and overall lack of bu interest. Methanol remained weak prices unchanged at DM245-25(fob Rotterdam for T2 product and T1 at $107-112/ton cif.

Product	European Spot price range $/ton	US price range $/ton
Ethylene	320-330 (cif)	n.a.
Propylene (100% basis)	388-414 (cif)	462-528
Butadiene	325-335 (fob)	396-418 (spot)
Benzene	260-270 (fob)	270-274 (spot)
Toluene	230-240 (fob)	243-258 (spot)
Xylenes (virgin)	305-310 (fob)	274-277 (spot)
(solvent)	300-305 (fob)	n.a.
Styrene	650-660 (T2)(fob)	661-685 (spot)
	615-625 (T1) (cif)	
Paraxylene	600-605 (fob)	n.a.
Orthoxylene	300-310 (fob)	n.a.
Ammonia	120-125 (c&f)	142-150 (fob)
Methanol	127-130 (T2)(fob)	158-160 (fob)
	107-112 (T1)(cif)	
Naphtha	159-163 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Appro sailing (5)
5/8	Este Clipper (V-805)(Dan)	Marine Trans	Boston; New York;; Baltimore; Norfolk; Charleston; Port Everglades; Jacksonville; Galveston; Houston; Los Angeles; Toronto; Montreal; Philadelphia; Savannah; New Orleans; South & Central American Ports. (Carting at T.P. No. 3).	10/8
		M.C.S./	Savannah; New York; Baltimore; Wilmington; Houston; Galveston; Los Angeles; Longbeach; Boston; Norfolk; Charleston; Jacksonville; Miami; Tempa; New Orleans; Providence; San Diego; Oakland; Sanfrancisco; Stockton; Chicago; Detroit; Cleveland; Milwaukee; Columbia; Kansas City; Atlanta; Nashville; Dallas; Minneapolis. (Carting at Hay Bunder No. 4).	
		Ranadip	New York; (Elizabeth); Portsmouth; (Norfolk); Baltimore; Charleston; Boston; Philadelphia; Houston; New Orleans; Jacksonville; Savannah; Wilmington (N.C.); Mobile; P. Everglades; (Miami); Los Angeles; (Longbeach); Oakland; Portland; Seattle; Anchorage; Montreal; Qubec; Ontario; Toronto via Halifax; Vancouver; Detroit. Also Caribbean and Mexican ports. (Carting at M.O.D. No. 3).	
5/8	Navigare (Voy-707)	Seaspeed/	New York; Baltimore; Norfolk; Savannah; Charleston; Houston & S. American Ports. (Carting at Hay Bunder No. 3).	10/8
		Oceanic	New York; Baltimore; Philadelphia; Chicago; Boston; Norfolk; Atlanta; Charleston; Savannah; Miami; Houston and other inland destinations in U.S. East Coast and S. American ports. (Carting at W.B. No. 3).	

(2)	(3)	(4)	(5)
Seacrest Pioneer (V-016)	Choice	New York; Baltimore; Norfolk; Savannah; Montreal; Toronto; Charleston; Houston; New Orleans; Miami; Tampa; Chicago and other inland destinations. (Carting at 19-ID).	15/8
Planeta	Killick	S. American Ports. (Carting at M-178/180 Cotton Depot).	11/8
Robert E Lee (V-55)(Ame)	Samarth	Philadelphia; Baltimore; Norfolk; New Orleans; Houston; Savannah; New York. (Carting at P/Q-PD).	9/8
Navigare	Seaspeed	West African Ports. (Carting at Hay Bunder No. 5).	10/8
Drvar (Yug)	Oceanic	P. Said; Rijeka.	12/8
Navigare (Voy-707)	Merzario/	Jeddah; Hodeidah; P. Sudan; Ravenna; Ancona; Piraeus; Venica; Trieste. (Carting at M.O.D. No. 2).	10/8
	Seaspeed/	Tilbury; London; Felixstowe; Manchester; Liverpool; Avonmouth; Le Havre; Rotterdam; Hamburg; Antwerp; Bremerhaven and Scandinavian Ports. (Carting at Hay Bunder No. 3).	
	L. Triest	Jeddah; Trieste; Venice; Ravenna; Rijeka; Naples. (Carting at M-171/173 C.D.).	
Este Clipper (Ger)(Voy-805)	Marine Trans/	Antwerp; Rotterdam; Hamburg; Bremen; Le Havre; Felixstowe; Hull; Rostock; London; Liverpool; Avonmouth; Copenhagen; Gothenburg; Aarhus; Oslo; Stockholm; Helsinki; Malmao; Norkopping; Helsingburg (including inland destinations for above ports); Lattakia; Limmasol; Izmir; Mersin; Istanbul; Beirut; Marseilles; Valencia; P. Said; Casablanca; Alexandria; Piraeus; Soloniki; Iraqi Ports. (Carting at T.P. No. 3).	10/8
	Khemka/	Larnaca; Antwerp; Rotterdam; Hamburg; Bremen; Gdansk; Le Havre; Copenhagen; Gothenburg; Aarhus; Oslo; Stockholm; Malmao; Helsinburg; Helsinki; Kopka; Rostock. (Carting at W. Bunder No. 3).	
	M.C.S./	Jeddah; Genoa; Felixstowe; Hamburg; Rotterdam; Antwerp; Le Havre; Lisbon; Aarhus; Copenhagen; Gothenburg; Oslo. (Carting at H.B. No. 4).	
	Ranadip	Jeddah; Palermo; Naples; Livorno; Leghorn; Marseilles (Fos); Genoa; Barcelona; Bilbao; Valencia; Alicante; Algiers; Lisbon; Leixoes; Bremerhaven; Le Havre; Antwerp; Rotterdam; Bremen; Hamburg; Aarhus; Piraeus; Gothenburg; Oslo; Copenhagen; Stockholm; Helsinki; Felixstowe; Tilbury; London; Avonmouth; Dublin; Belfast; Grangemouth; Liverpool; Manchester. (Carting at M.O.D. No. 3).	
Seacrest Pioneer (Voy-016)	Choice	Leghorn; Marseilles; Valencia; Genoa; Cadiz; Barcelona; Ravenna; Venice; Naples; Trieste; La Spezia and other inland destinations. (Carting 19-ID).	15/8
Robert E Lee	Samarth	Aqaba; Assab; (Alexandria). Carting at P/Q-PD).	9/8
Arab Mazin	Depe	Aden; Jeddah.	20/8
Tibor Szamuely (Rus) (V-101 W/B)	Transocean	Odessa; Izmail; Reni (U.S.S.R); Russe; Bulgaria; Budapest; (Hungary); Linz; Vienna (Austria); Bratislava (Czechoslovakia); Deggendorf; Regenborg; (West Germany). (All ports on River Danube). (Carting at N/O-PD & G-PD).	21/8
Kalidas	S.C.I.	Chittagong (Carting at CFS)	10/8
Este Clipper	Marine Trans	Colombo. (Carting at Timber Pond No. 3)	10/8
Este Clipper (Ger)	Marine Trans/	Singapore; Hongkong; Busan; Kobe; Tokyo; Djakarta. (Carting at T.P. No. 3).	10/8
	M.C.S./ Ranadip	Singapore; Hongkong; Keelung; Kaohsiung; Jakarta; Surabaya; Bangkok; Penang; P. Kelang; Kobe; Yokohama. (Carting at H.B. No. 4 for M.C.S.) (Carting at M.O.D. No. 3 for Ranadip).	
Planeta	Killick/ T.Tea/I.M.E.	Singapore. (Carting M-178/180 Cotton Depot for Killick). (Carting at T.P. No. 4 for Tata Tea)(Carting at Wadi Bunder No. 3 for I.M.E.).	11/8
Robert E Lee	Samarth	Singapore. (Carting at P/Q-PD).	9/8
Kalidas (N.Sheva)	S.C.I.	Singapore & other Far East Ports. (Carting at CFS)	10/8
Este Clipper	M.C.S.	Sydney; Melbourne; Brisbane; Burnie; New Castle. (Crtg. H.B. No. 4).	10/8
Planeta (Sing) (Voy-36)	Killick/ Tata Tea/	Melbourne; Sydney; Brisbane; Adelaide; Fremantle; P. Hobart; Devon P. Launceston; Burnie; P. Chalmers; Lyttelton; Christchurch; Dunedin; New Plymouth; Auckland; Wellington; Napier. Also Western Samoa; Papua; New Guinea; Solomon Island; American Samoa; Tonga; New Calidonia; Rabaul; P. Villa. (Carting at M-178/180 Cotton Depot for Killick) (Carting at Timber Pond No. 4 for Tata Tea).	11/8
	I.M.E.	Sydney; Melbourne; Adelaide; Fremantle; Brisbane; Auckland; Wellington; Lyttelton. (Carting at Wadi Bunder No. 3 for I.M.E.).	

(1)	(2)	(3)	(4)	(5)
8/8	Kalidas (N.Sheva)	S.C.I.	Melbourne; Fremantle; Adelaide; Sydney. (Carting at CFS).	10/
9/8	Seacrest Pioneer (V-016)	Parekh/	Muscat; Dubai; Sharjah; Abu Dhabi; Bahrain; Dammam; Kuwait; Baghdad. (Carting at Hay Bunder No. 4).	15/
		Choice	Dubai; Dammam; Kuwait; Muscat; Bahrain; Abu Dhabi. (Crtg. 19-ID).	
5/8	Navigare	Merzario/	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Dammam; Kuwait; Bahrain. (Carting at M.O.D. No. 2 for Merzario).	10/
		Seahorse/	Muscat. (Carting at M.O.D. No. 3).	
		L. Triest/	Dubai; Dammam; Riyadh; Muscat; Abu Dhabi; Doha; Kuwait; Bahrain. (Carting at 171/173 Cotton Depot for L. Triest).	
		Seaspeed	Dubai; Dammam; Bahrain; Kuwait; Doha. (Carting at H.B. No. 5).	
5/8	Este Clipper (V-805)	Ranadip	Dubai; Muscat; Abu Dhabi; Doha; Dammam; Bahrain; Kuwait. (Carting at M.O.D. No. 3).	10/
10/8	Hafeez (Ir)	J.M. Baxi	Bandar Abbas.	17/
10/8	Vishva Nandini	S.C.I	P. Louis; Tamatave; Mombasa; Dar Es Salaam; Beira & inland destinations in E. Africa. (Carting at Timber Pond No. 1).	18/

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

Due Date	Steamer's Name	Agents	From
12/8	Arunachal Pradesh	S.C.I.	U.S./Canada
11/8	Ind. Freedom	I.S.S. Co.	U.K. Cont.
13/8	Lushan	F.F.C. Co.	U.K. Cont.
20/8	Tibor Szamuely (Voy-101)	Transocean	Russia/E. Europe
10/8	Vishva Nandini	S.C.I.	E. Africa

Materials Imported

TIC MATERIALS IMPORTED MADRAS (From 8.6.89 to 30.6.89)

LYETHYLENE: From Singa- Interplamak Plastic Packs (I), 34 Rs. 6,59,607.

ICON CARBIDE: From Brazil: rundum Universal Ltd., 9 MTs., 19,195.

NYL CHLORIDE COPOLY- ISED: From Japan: Murugappa ronics Ltd., 4,000 Kgs., 68,107.

G MATERIALS IMPORTED MADRAS (From 8.6.89 to 30.6.89)

FORMYL RIFAMPYCIN: From Curekraft Chemicals (I) Pvt. Ltd., 3 Kgs., Rs. 2,92,113.

UPROFEN BP 80: From Korea: un Drugs, 500 Kgs., Rs. 1,27,958.

ORPHOLINE: From FRG: Savera s Pvt. Ltd., 16,224 Kgs., 5,65,914.

RIMETHOPRIM BP 80: From g Kong: Inventaa Chemicals Pvt. , 1,500 Kgs., Rs. 6,95,470.

MATERIALS IMPORTED MADRAS (From 16.6.89 to 20.6.89)

ACETYL CHLORIDE: From FRG: ya Chemicals, 15,580 Kgs., 3,81,460.

ACRYLONITRILE: From Japan: sad Drugs Pvt. Ltd., 12,800 Kgs., 2,45,354.

AROMATIC CHEMICALS: From itzerland: Bush Boake Allen (I) Ltd., 3 Kgs., Rs. 41,889.

BARBITURIC ACID: From FRG. rbros Chemicals (P) Ltd., 400 Kgs., . 57,879.

BENZOQUINONE: From UK: Devi lymers P. Ltd., 250 Kgs., Rs. 67,845.

BUTYL GLYCOL: From USA: Tushar Enterprises, 14,800 Kgs., Rs. 1,73,620.

CAPROIC ACID: From Netherlands: Reckitt & Colman of India Ltd., 220 Ltr., Rs. 35,084.

CARBOFURAN: From USA: Rallis India Ltd., 18,000 Kgs., Rs. 31,68,922.

CAUSTIC SODA: From Srilanka: Mettur Chem & Indl. Corpn. Ltd., 169.46 Kgs., Rs. 11,14,320.

COUMARIN: From China: Shah Incense Works, 500 Kgs., Rs. 1,24,572.

DL-METHIONINE: From Japan: Komarla Feeds, 200 Kgs., Rs. 1,03,745.

DIHYDROMYRCENOL: From USA: Sri Vijayalakshmi Agarbathi Works, 172 Kgs., Rs. 20,467.

DIMETHYL PHENYL ETHYL CARBINOL: From Switzerland: Padmini Products, 100 Kgs., Rs. 38,123.

EPICHLOROHYDRIN: From Japan: EID Parry (I) Ltd., 10,040 Kgs., Rs. 1,89,958.

ETHANOLAMINE: From Singapore: Micro Pack Ltd., 640 Lts., Rs. 26,296.

GAMMA FERRIC OXIDE: From FRG: Audio Electronic Co. Pvt. Ltd., 1,000 Kgs., Rs. 85,527.

HEXA METHYLENE DIAMINE ADIPATE: From FRG: Shriram Fibres Ltd., 35,000 Kgs., Rs. 10,41,826.

HYDROCHLORIC ACID: From Singapore: Micropack Ltd., 1,200 Ltrs., Rs. 73,250.

HYDROGEN PEROXIDE: From Singapore: Micropack Ltd., 400 Ltrs., Rs. 20,948.

HYDROXYLAMINE SULPHATE: From Japan: Priya Chemicals, 10 MTs., Rs. 2,68,317; Unichem Labs. Ltd., 43,000 Kgs., Rs. 11,89,820.

ISO PROPYL ALCOHOL: From China: Shasun Drugs, 25,600 Kgs., Rs. 2,80,511.

LAB CHEMICALS: From FRG: Kay Peekay Medical Services, 13 Nos., Rs. 500.

LINALYL ACETATE: From USA: Sri Amar Trading Co., 907 Kgs., Rs. 1,38,293.

MANGANESE OXIDE: From Belgium: Hilversum Electronics Pvt. Ltd., 16,224 Kgs., Rs. 5,65,914.

METHYLACETOACETATE: From Japan: Savera Labs Pvt. Ltd., 27,600 Kgs., Rs. 6,42,140; Shasun Chemicals Ltd., 16,000 Kgs., Rs. 3,68,241.

METHYL ETHYL KETONE: From UK: MRL, 1,02,960 Kgs., Rs. 21,07,348.

MONOETHYLENE GLYCOL: From Saudi Arabia: Indian Organic Chemicals Ltd., 3,000 MTs., Rs. 6,21,86,510.

N-ACETYL SULPHANILYL CHLORIDE: From Japan: I.E.C. Chemi Tech Pvt. Ltd., 10,500 Kgs., Rs. 5,36,406.

N-METHYL D-GLYCAMINE: From France: Benzex Labs Ltd., 1,500 Kgs., Rs. 4,04,447.

NICKEL SULPHAMATE: From USA: Rao Insulating Co. Ltd., 50 Kgs., Rs. 19,184.

PARAFORMALDEHYDE: Rane Brake Linings Ltd., 10,000 Kgs., Rs. 1,47,870.

PARAHYDROXY PHENYL GLYCOL: From Singapore: TTK Chemicals Ltd., 1,000 Kgs., Rs. 2,37,956.

PHENOL FORMALDEHYDE: From FRG: Lakshmi Electrical Control Systems Ltd., 1,000 Kgs., Rs. 29,935.

PHENYL ISOTHIOCYANATE: From FRG: Hindustan Photo Films Mfg. Co., 53 Kgs., Rs. 31,265.

PHOSPHORIC ACID: From Singapore: Micropack Ltd., 840 Ltrs., Rs. 50,074.

PROPYLENE GLYCOL: From Singapore: The Chemical Corpn. Pvt. Ltd., 33.54 MTs., Rs. 7,60,094; Metro Products (India), 17,200 Kgs., Rs. 3,64,992; From USA: Metro Product (India), 17,200 Kgs., Rs. 3,64,992.

PYRIDINE: From Belgium: Dolphin Drugs Pvt. Ltd., 5,000 Kgs., Rs. 3,26,166.

SILICA COLLOIDAL: From Belgium: Citadel Fine Pharmaceuticals Pvt. Ltd., 300 Kgs., Rs. 31,444.

SODIUM BOROHYDRIDE: From FRG: TPS Labs Ltd., 200 Kgs., Rs. 1,75,994.

SODIUM CYANIDE: From Brazil: Cheminor Drugs Pvt. Ltd., 24,000 Kgs., Rs. 10,22,355.

SODIUM METAL: From Belgium: Dolphin Drugs Pvt. Ltd., 10,080 MTs., Rs. 1,98,058; From Japan: Unichem Lab Ltd., 9.86 MTs., Rs. 3,40,974.

TERPINEOL: From USA: Mysore Sugandhi Dhoop Factory, 1,143 Kgs., Rs. 37,910.

TITANIUM DIOXIDE: From Switzerland: Vijay Paints & Pigments Co., 205 Kgs., Rs. 16,520; From USA: Quinn India Ltd., 9 MTs., Rs. 3,54,382.

TOLUENE DI ISOCYANATE: From Japan: U-Foam Pvt. Ltd., 16,000 Kgs., Rs. 5,42,829.

TRIMETHOXY BENZALDEHYDE: From Japan: Coastal Pharma Chemicals, 3,000 Kgs., Rs. 11,09,124; Premier Organics, 1,020 Kgs., Rs. 3,72,773.

TRIMETHOXY BENZOIC ACID: From Spain: Deccan Drugs Ltd., 20 MTs., Rs. 22,63,516.

MATERIALS IMPORTED BOMBAY
(From 13.4.89 to 17.4.89)

ACRYLIC ACID: From Japan: Arofines, 2 MTs., Rs. 63,573.

ALDEHYDE: From Switzerland: Nangrai Inds., 100 Kgs., Rs. 30,918.

ALPHA NAPHTHOL: From N erlands: Indian Dyestuff Inds. L MTs., Rs. 3,54,061.

ALPHAPHENYL GLYC CHLORIDE: From Switzerland: cord Pharmaceuticals Ltd., 5,460 Rs. 19,71,521.

ALUMINIUM OXIDE SYN TIC: From FRG: Grindwell N Ltd., 14,000 Kgs., Rs. 1,99,979.

AMINO PROPYL BENZY MINE: From France: United Pestic & Nonionics, 500 Kgs., Rs. 27,3

ANISALDEHYDE: From Ja Grauer & Weil (I) Ltd., 1,125 Rs. 1,75,953.

AROMATIC CHEMICALS: I Netherlands: Kanta Chemical Co. Kgs., Rs. 96,786; From Taiwan: chem Inds., 400 Kgs., Rs. 59,797

BETA PICOLINE: From Belg Rupal Chemical Inds. Pvt. Ltd., 14 Kgs., Rs. 6,36,239.

BENZYLOXYPHENBUTAZO From UK: Pragati Chemicals, 12 Kgs., Rs. 4,88,967.

BROMINE LIQUID: From Ne lands: Gujarat Insecticides, 11,340 K Rs. 2,87,299.

BUTACHLOR: From USA: M fed Agro Chemicals, 2,09,520 I Rs. 42,86,120.

BUTACHLOR TECH: From U Hindustan Pulverising Mills, 15 MTs., Rs. 7,41,828.

BUTYL ACRYLATE: From Ja PDI Chemicals Ltd., 7,200 K Rs. 2,18,722.

CALCIUM CYANAMIDE: F FRG: German Remedies Ltd., 64, Kgs., Rs. 7,32,770.

CAPROIC ACID: From Ja Industrial Perfumes Ltd., 540 K Rs. 42,487.

CARBON BLACK: From Fi Bombay Paints & Allied Produ 2,400 Kgs., Rs. 58,422; Kores (I) L

Kgs., Rs. 1,07,025.

HLORO PHENOTHIAZINE: rance: May & Baker India Ltd., gs., Rs. 3,39,898.

OLESTEROL: From Japan: el Pharmaceuticals India, 200 Rs. 1,04,926.

OLINE CHLORIDE: From UK: nex India Ltd., 12,000 Kgs., 20,698.

ROMIUM DIOXIDE: From UK: Magnetics Ltd., 600 Kgs., 56,304.

CLOHEXANONE: From FRG: ectronics Inds., Pvt. Ltd., 14,820 Rs. 3,68,225.

CLOHEXYL SALICYLATE: FRG: Industrial Perfumes Ltd., gs., Rs. 73,952.

ALPHA PHENYL GLYCINE ORIDE HYDRO CHLORIDE: Netherlands: Armour Chemicals 5,775 Kgs., Rs. 19,74,765; From erland: Gujarat Lyka Organics 5,460 Kgs., Rs. 19,10,546.

PARA HYDROXY PHENYL CINE METHYL POTASSIUM E SALT: From Singapore: Aro- Chemicals Ltd., 1,000 Kgs., ,22,588.

-MALIC ACID: From Japan: r & Weil India Ltd., 500 Kgs., 0,007.

SMODUR: From Belgium: r Overseas Pvt. Ltd., 6,750 Kgs., ,19,011; From FRG: Asian Paints td., 8,500 Kgs., Rs. 3,30,446.

DIAMINO PHENYL HANE: From Belgium: Shakti ated Wires Pvt. Ltd., 2,000 Kgs., ,41,021.

CHLORO ACETYL CHLO- E: From FRG: Rallis India Ltd., Kgs., Rs. 19,936.

DICHLORO ANILINE: From a: Hindustan Ciba Geigy Ltd., 0 Kgs., Rs. 91,267.

DICHLORO 1,4 NAPHTHAQUINONE: From Japan: Reine Chemicals, 500 Kgs., Rs. 80,027.

DIETHYL CARBAMOYL CHLORIDE: From FRG: Calyx Chemicals, 950 Kgs., Rs. 69,775.

DIMETHYL FORMAMIDE: From Japan: Mihir Chemicals, 27,200 Kgs., Rs. 2,51,148.

EPICHLOROHYDRINE: From China: Cibatul Ltd., 32,000 Kgs., Rs. 8,29,956; From Japan: German Remedies Ltd., 2,400 Kgs., Rs. 68,735; Grauer & Weil India Ltd., 5,040 Kgs., Rs. 1,42,995.

ETHYLTHIOETHANOL: From Belgium: Neelam Drugs & Pharmaceuticals, 1,000 Kgs., Rs. 37,766.

ETHYL VANILLIN: From France: Britannia Inds. Ltd., 1,300 Kgs., Rs. 5,24,718.

HYDROBROMIC ACID: From Japan: Reliance Inds. Ltd., 33 MTs., Rs. 4,15,431.

HYDROXYLAMINE SULPHATE: From USA: Roche Products Ltd., 32,000 Kgs., Rs. 8,98,843.

HYDROXYQUINOLINE: From France: Kirti Chemicals, 1,000 Kgs., Rs. 1,91,313.

IRON OXIDE: From USA: Polychem Ltd., 2,449.42 Kgs., Rs. 2,69,809.

ISO BORNYL CYCLO HEXANOL: From France: Hindustan Lever Ltd., 3,000 Kgs., Rs. 5,24,010.

ITACONIC ACID: From USA: Highland Dye Works, 1,000 Kgs., Rs. 59,010.

LINALYL ACETATE: From France: Seth Bros. Perfumes Pvt. Ltd., 400 Kgs., Rs. 60,624.

LITHIUM CARBONATE: From USA: Himatlal H. Joshi, 2,200 Lbs., Rs. 55,910.

MANNITOL: From Brazil: Atul Products Ltd., 22,500 Kgs., Rs. 6,01,902.

METHYL HEPTONE: From FRG: Gupta & Co. Ltd., 350 Kgs., Rs. 46,126.

MONOETHYL ANILINE: From Japan: Golden Chemical Inds., 190 Kgs., Rs. 13,163.

MUSK KETONE: From China: Cosmain Products, 250 Kgs., Rs. 1,14,086.

ORTHANILIC ACID: From FRG: Chemiequip Ltd., 1.430 MTs., Rs. 1,82,336.

ORTHOXYLENE: From France: Herdillia Chemicals Ltd., 1,000 MTs., Rs. 99,13,706; From Netherlands: Shri Ambuja Petrochemicals Ltd., 969.848 MTs., Rs. 99,20,019.

PANTOTHENYL ALCOHOL: From Switzerland: Jiva Kuka & Co., 500 Kgs., Rs. 1,33,756.

PARA CHLORO TOLUENE: From FRG: Bakul Chemicals Pvt. Ltd., 28,800 Kgs., Rs. 8,79,460; From Japan: Arlabs Ltd., 30,000 Kgs., Rs. 7,88,322.

PARAFORMALDEHYDE: From Spain: Speciality Chemicals, 18,000 Kgs., Rs. 1,62,867; Sun Export Corpn., 18,000 Kgs., Rs. 1,64,613.

PARATERTIARY BUTYL PHENOL: From Japan: Bakelite Hylam Ltd., 14,000 Kgs., Rs. 3,04,020.

PHENYL ACETALDEHYDE DIMETHYL ACETAL: From FRG: Kanta Chemical Co., 100 Kgs., Rs. 25,182.

PHENYL XYLYL ETHANE: From Japan: Hind Condensor Ltd., 3,000 Kgs., Rs. 94,416.

PIVALOYL CHLORIDE: From USA: Aurobindo Pharma Pvt. Ltd., 5,280 Lbs., Rs. 1,46,476.

POTASSIUM FERROCYANIDE: From Germany: S.D. Fine Chem Pvt. Ltd., 16 MTs., Rs. 3,09,504.

PROPYLENE GLYCOL: From Japan: Imkemex India Ltd., 11,970 Kgs., Rs. 2,54,286; From USA: C.J. Shah & Co., 58,695 Kgs., Rs. 1,18,292; M.J. Exports Ltd., 50,310 Kgs., Rs. 9,89,604.

PYRIDOXIDE HYDROCHLORIDE: From Yugoslavia: Physicare Labs Pvt. Ltd., 100 Kgs., Rs. 59,445.

SELENIUM METAL: From Japan: Sudarshan Chemical Inds., 300 Kgs., Rs. 99,137.

SODIUM CHLORITE: From Spain: Colour-Chem Ltd., 1,050 Kgs., Rs. 39,242.

SODIUM 2 ETHYL HEXANOATE: From UK: Ranbaxy Labs Ltd., 1,000 Kgs., Rs. 64,878.

TITANIUM DIOXIDE: From FRG: Ask Enterprises, 10,000 Kgs., Rs. 4,28,020; Shree Synthetics Ltd., 5 MTs., Rs. 2,24,238.

THIOGLYCOLLIC ACID: From FRG: Lakme Ltd., 1,000 Kgs., Rs. 55,401.

THIONYL CHLORIDE: From FRG: Burroughs Wellcome I Ltd., 5,100 Kgs., Rs. 56,081.

TRIETHYL PHOSPHITE: From USA: Indian Dyestuff Inds., Ltd., 3.5517 MTs., Rs. 1,67,668; From FRG: Sudarshan Chemical Inds. Ltd., 14,400 Kgs., Rs. 5,32,508.

TRIMETHOXY BENZALDEHYDE: From China: Marvel Drugs Pvt. Ltd., 3,000 Kgs., Rs. 10,85,787.

XYLENOL: From Italy: Dr. Beck & Co., 62,400 Kgs., Rs. 2,02,863.

XYLIDINE: From Switzerland: MB Finance Corpn., 2,000 Kgs., Rs. 1,36,234.

PLASTIC MATERIALS IMPORTED BOMBAY (From 13.4.89 to 17.4.89)

CAPROLACTUM: From Italy: The Baroda Rayon Corpn. Ltd., 311.6 MTs., Rs. 95,12,500; From Netherlands: Nirlon Syn. Fibres & Chem. Ltd., 612 MTs., Rs. 1,84,42,325; From Spain: Mudijun Fibres Co., 25,000 Kgs., Rs. 75,82,757.

HDPE: From Brazil: Hill Pac Ltd., 42 MTs., Rs. 6,98,182; Saudi Arabia: Associated Bros., 2 MTs., Rs. 3,89,467; Kokan Pl 17,150 Kgs., Rs. 2,99,559; Kuppi dan Bros Devidayalan, 102.9 Rs. 15,52,722; Milan Plast, 49.5 Rs. 7,75,040.

PVC RESIN: From FRG: Plast Pvt. Ltd., 12.5 MTs., Rs. 2,3 Royal Cushion Vinyl Pvt. Lt MTs., Rs. 2,62,113; From Korea Leathers P. Ltd., 13 MTs., Rs. 6,2 J.K. Rexine Pvt. Ltd., 100 Rs. 20,93,661; Manish Vinyls, 5 Kgs., Rs. 11,02,762; From Ror Asian Plastics, 1,00,000 Rs. 13,17,500; Kalpana Plastics MTs., Rs. 19,72,985.

POLYETHYLENE: From Surgi Plast Ltd., 3,750 Kgs., Rs. 9 From Sweden: Telephone Cables 16,250 Kgs., Rs. 2,41,940; H Plastics, 15 MTs., Rs. 2,43,122; giplast Ltd., 10 MTs., Rs. 2,5 From Portugal: Mohan Oversea Ltd., 49.5 MTs., Rs. 7,58,787; S Plastics, 49.5 MTs., Rs. 7,82,301; Brazil: Xpro India, 83.5 Rs. 19,51,229.

POLYSTYRENE: From K Janata Plastics Corpn., 17 Rs. 3,87,993.

POLYVINYL PYRROLID From USA: Roche Products Ltd Kgs., Rs. 64,203.

SILICON CARBIDE: From Diamond Carbon & Graphics Pro 18,000 Kgs., Rs. 3,34,152.

DRUG MATERIALS IMPOR BOMBAY (From 13.4.89 to 17.4.89)

D-CALCIUM PANTOTHEN From Japan: Rallis India Ltd., 500 Rs. 1,04,941.

D-PANTHENOL USP: From zerland: Biological Ltd., 400 Rs. 1,16,447.

MORPHOLINE: From FRG: man Remedies Ltd., 2,000 Kgs., 69,671.

THEOPHYLLINE ANHYDROUS: m China: CIPLA Ltd., 1,500 Kgs., 3,37,538.

MATERIALS IMPORTED MADRAS
(From 1.7.89 to 6.7.89)

ACEPHATE (ORTHENE): From SA: ACI Ltd., 10,000 Kgs., s. 18,86,263.

ACETYLENE BLACK 50%: From ingapore: Union Carbide India Ltd., 20 MTs., Rs. 5,75,058.

ALLYL CHLORIDE: From Japan: rauer & Weil India Ltd., 14,000 Kgs., s. 3,92,698; Platewel Processes and Chemicals, 5.04 MTs., Rs. 1,41,017.

ALPHA OLEFIN SULPHONATE: From France: Chemicals & Plastics Ltd., 36,000 Kgs., Rs. 4,37,693.

ALUMINIUM CHLORIDE: From USA: Hyderabad Batteries Ltd., 27 Kgs., Rs. 9,027.

ALUMINIUM CHLOROHYDRATE: From UK: Trichy Distilleries & Chemicals, 36,000 Kgs., Rs. 1,98,951.

ALUMINIUM OXIDE: From China: Carborandum Universal Ltd., 83 MTs., Rs. 6,29,899.

ALUMINIUM OXIDE 'C': From FRG: Lumino Lamps Ltd., 100 Kgs., Rs. 20,166.

AMMONIUM PENTABORATE: From Japan: Keltron Component Complex Ltd., 2,500 Kgs., Rs. 1,35,555.

ANTIMONY TRISULPHIDE: From FRG: IDL Chemicals Ltd., 2,880 Kgs., Rs. 3,86,173.

AROMATIC CHEMICALS: From France: Mysore State Agarbathi Mfg., 2,000 Kgs., Rs. 3,55,248; From Japan: Karnataka Soaps & Detergents, 360 Kgs., Rs. 1,86,741; From Netherlands: Bharat & Industrial Corpn., 2,000 Kgs., Rs. 2,05,543; From Switzerland: N. Ranga Rao & Sons, 875 Kgs., Rs. 1,97,371.

CARBON BLACK: From China: Dunlop India Ltd., 77 MTs., Rs. 7,51,485.

CHLOROTRIFLUORO DIBROMOETHANE: From UK: I.E.L. Ltd., 8,000 Kgs., Rs. 7,26,092.

2-CHLOROPYRIDINE: From Singapore: Venkatarama Chemicals Ltd., 4,740.5 Kgs., Rs. 10,69,294.

DIMETHYL PHENYL ETHYL CARBINOL: From Switzerland: Padmini Products, 100 Kgs., Rs. 39,359.

EPICHLOROHYDRIN: From Japan: Synthokem, 3,000 Kgs., Rs. 92,443.

ETHYL GLYCOL: From FRG: Khizar Hussain & Sons, 4,116 Kgs., Rs. 93,598.

FURFURYL ALCOHOL: From Belgium: Coromandel Prodorite Ltd., 6 MTs., Rs. 1,60,332; Globe Organic Ltd., 18,720 Kgs., Rs. 5,92,450.

GRISEOFULVIN: From China: American Remedies Pvt. Ltd., 260 Kgs., Rs. 2,18,965.

GUAIACOL: From Italy: Machmeijer Aromatics India Ltd., 1 Kg., Rs. 66; From Japan: Sri Venkateswara Chemicals, 1,000 Kgs., Rs. 1,03,435.

GUM BENZOIN: From Indonesia: Alaroma, 200 Kgs., Rs. 7,231.

HEXA HYDROPHTHALIC ANHYDRIDE: From Italy: SIP Resins Ltd., 3,080 Kgs., Rs. 1,28,153.

ISOBUTYL BENZENE: From USA: Chandra Pharmaceuticals Ltd., 27,314 Kgs., Rs. 13,85,062.

ISODECANOL: From UK: Indian Explosives Ltd., 1,032 Kgs. Rs. 18,950.

META CRESOL: From Japan: Maschmeijer Aromatics Ltd., 16 MTs., Rs. 7,54,506.

METHYL ACETOACETATE: From Japan: Vani Chemicals & Intermediates Ltd., 16,000 Kgs., Rs. 3,80,271.

METHYL METHACRYLATE MONOMER: From Japan: New Synthetic Chemical Inds., 15,200 Kgs., Rs. 2,82,914.

METHYLENE CHLORIDE: From Netherlands: TTK Chemicals Ltd., 19,440 Kgs., Rs. 2,00,151.

MONOCROTOPHOS TECH.: From Switzerland: Gujarat Agro Inds. Corpn. Ltd., 16,280 Kgs., Rs. 15,99,294.

N-ACETYL SULPHANILYL CHLORIDE: From Japan: Metro Exporters Ltd., 40 MTs., Rs. 20,12,014; Std. Organics Ltd., 100 MTs., Rs. 44,30,769.

POLY TETRAMETHYLENE ETHER GLYCOL: From USA: Urethanes India Ltd., 16,000 Kgs. Rs. 8,55,106.

PROPYLENE GLYCOL: From Singapore: Godswill Chemicals, 370 Kgs. Rs. 11,450.

SILICON CARBIDE: From Norway: Carborandum Universal Ltd. 21,000 Kgs., Rs. 4,60,243.

SILICON METAL: From Hong Kong: Padma Metals, 5 Kgs. Rs. 92,348; Sargam Metals, 15,000 Kgs., Rs. 2,77,045; From Japan: Inventaa Chemicals Pvt. Ltd., 5,100 Kgs. Rs. 1,81,908; Metro Exporters Ltd. 9.86 MTs., Rs. 3,40,974.

SODIUM POLYACRYLATE: From Japan: Marubeni Corporation, 500 Kgs. Rs. 69.

TERTIARY BUTYL METAXYLENE: From FRG: Maschmeijer Aromatics India Ltd., 14,040 Kgs. Rs. 6,47,484.

TITANIUM DIOXIDE: From FRG: McDowell and Co., 8,000 Kgs. Rs. 3,68,812; From Switzerland: Vijay Paints & Pigments Co., 246 Kgs. Rs. 21,707.

ZINC ASH: From Malaysia: Saravanan Anandhi Enterprises, 20 MTs. Rs. 1,17,891.

PLASTIC MATERIALS IMPORTED MADRAS (From 1.7.89 to 6.7.89)

ACRYLONITRILE MONOMER: From FRG: Gujarat State Export Corpn. Ltd., 12,174 Kgs., Rs. 2,64,382; From Netherlands: Gujarat State Export Corpn. Ltd., 12,174 Kgs., Rs. 2,64,382.

HDPE: From Saudi Arabia: Eco Pack Pvt. Ltd., 17,150 Kgs., Rs. 3,05,972; From Singapore: Nidhi Plastics Ltd., 51,000 MTs., Rs. 7,88,556; Sri Narasimha Plastic Inds. Pvt. Ltd., 16,675 Kgs., Rs. 2,38,620.

LDPE: From Singapore: Cirfab Pvt. Ltd., 16 MTs., Rs. 2,83,542.

PVC RESINS: From Singapore: Rabbani Exports, 14.5 MTs., Rs. 1,76,900.

POLYPROPYLENE: From Singapore: Cirfab Pvt. Ltd., 32 MTs., Rs. 5,06,919; Swarnarathinam Industries, 16 MTs., Rs. 2,66,592; VPS Iyyamperumal Nadar & Sons, 48,000 Kgs., Rs. 7,84,686; From USSR: Ultramarine & Pigments Ltd., 31 MTs., Rs. 5,16,522.

POLYPROPYLENE GRANULES: From Singapore: Ultramarine & Pigments Ltd., 15.5 MTs., Rs. 2,58,261.

DYE MATERIALS IMPORTED MADRAS (From 1.7.89 to 6.7.89)

PALANIL BRILL BLUE B88: From Hong Kong: Sheraton Leather Fabrics, 500 Kgs., Rs. 1,65,048.

SAVINYL BLACK: From Switzerland: Eastern Chrome Tanning Corpn., 25 Kgs., Rs. 17,040.

SAVINYL RED: From France: Tata Exports Ltd., 25 Kgs., Rs. 20,858.

MATERIALS EXPORTED MADRAS (From 15.6.89 to 21.6.89)

CALCIUM SENNOISIDE: To Frankfurt: Kothari Phytochem International, 1,000 Kgs., Rs. 3,39,000.

HEXAMETHYLENE DISILOXANE: To Hamburg: Max India Ltd., 11,470 Kgs., Rs. 1,32,057.

HYDROGEN PEROXIDE: To Kobe: Asian Peroxides Ltd., 17,000 Kgs., Rs. 1,41,131.

DRUG MATERIALS EXPORTED MADRAS (From 15.6.89 to 21.6.89)

ERYTHROMYCIN: To Larnaca: Pradeep Drug Co., 250 Kgs Rs. 2,04,000.

FERROUS FUMERATE USP: To Colombo: Medopharm, 288 Kgs Rs. 10,930.

IBUPROFEN BP80: To Hamburg: Shasun Drugs, 1,000 Kgs. Rs. 2,43,655; To Bangkok: Shasun Drugs, 750 Kgs., Rs. 1,85,632.

IBUPROFEN USP & BP80: To New York: Cheminor Drugs Pvt. Ltd., 20,000 Kgs., Rs. 49,11,532.

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CALCIUM NITRATE
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COPPER SULPHATE
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CUPROUS NITRATE
CALCIUM CHLORIDE
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FERRIC CHLORIDE
FERROUS AMMONIUM SULPHATE
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HYPO
MANGANESE SULPHATE
MAGNESIUM STEARATE
MAGNESIUM SULPHATE
MOLYBDIC ACID
MAGNESIUM NITRATE
MAGNESIUM OXIDE
NICKEL SULPHATE
NICKEL CARBONATE
POTASSIUM BROMIDE
POTASSIUM NITRITE
POTASSIUM ACETATE
POTASSIUM IODIDE
POTASSIUM BROMATE
POTASSIUM IODATE
POTASSIUM META BISULPHITE
SODIUM BENZOATE
SODIUM CITRATE
SODIUM META BISULPHATE
STRONTIUM CHLORIDE
SODIUM BROMIDE
SODIUM MOLYBDATE
SULPHUR
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